

THE IRON AGE

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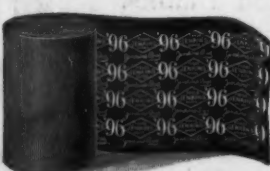
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THE IRON AGE

New York, Thursday, May 27, 1909.

The Brown & Sharpe No. 12 Plain Grinder.

The Brown & Sharpe Mfg. Company, Providence, R. I., has brought out a new size in its No. 12 plain grinding machine which swings 8 in. and takes 36 in. between centers. It is equipped with automatic feeds, and contains the typical features of the company's cylindrical grind-

portant in the class of work which it performs, because it is possible to obtain a correct table feed for any work speed, and when it is desired to remove stock rapidly a slow speed and fast feed are available.

Among the new mechanical features of the machine

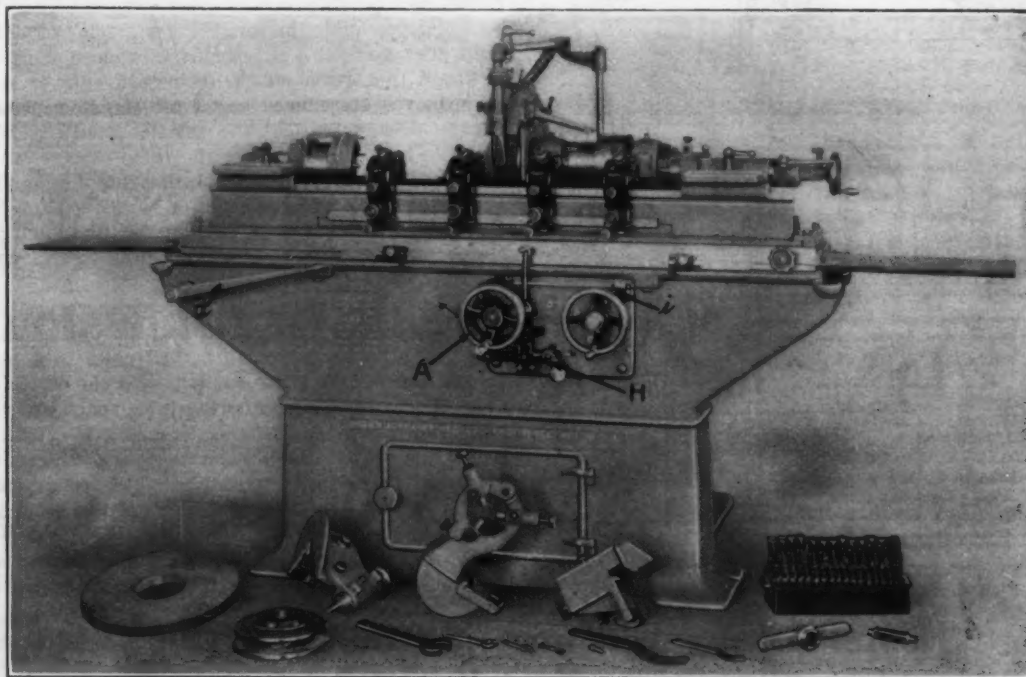


Fig. 1.—Front View of the No. 12 Plain Grinding Machine Built by the Brown & Sharpe Mfg. Company, Providence, R. I.

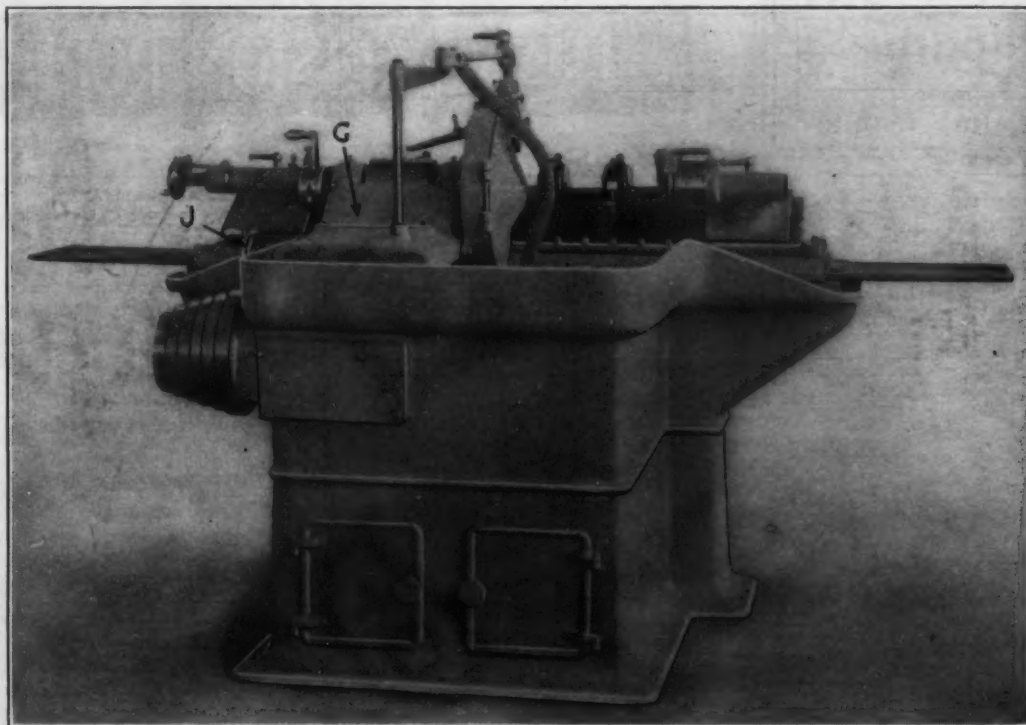


Fig. 2.—Rear View of the No. 12 Brown & Sharpe Plain Grinder.

ers, combined with a number of important and interesting improvements. It is designed for grinding spindles, shafts, rolls and all other work, either straight or taper, revolving on two dead centers, and is essentially a commercial machine. The work speeds and table feeds are completely separated, an arrangement deemed very im-

portant in the class of work which it performs, because it is possible to obtain a correct table feed for any work speed, and when it is desired to remove stock rapidly a slow speed and fast feed are available. A very important new adjunct is the mechanism which, by the pushing in of a knob, places

the hand wheel in connection with the table traverse, and at the same time makes operative a clutch device which stops the feed at the end of the table traverse, so that the table comes to a standstill when the wheel is off the work at the footstock or when it is up to a shoulder at the headstock end. The cross feed is arranged so that the automatic feed of the grinding wheel slide may be disengaged, permitting it to be moved quickly by a hand

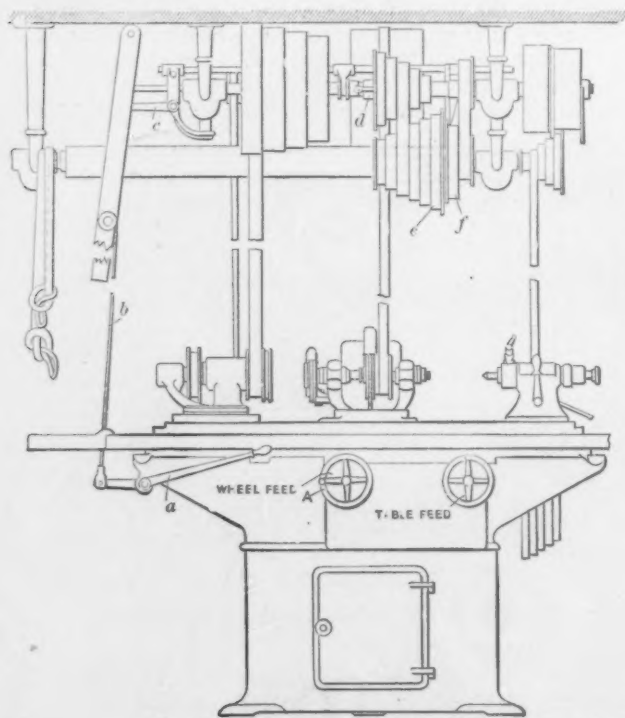


Fig. 3.—The Countershaft and Control.

the overhead works which feeds the table and drives the work driving pulley on the headstock, is shown at the left of the bed in Fig. 1 and also in Fig. 3. It connects through a piece of wrought iron piping *b* with the bell crank lever *c*, which operates the clutch *d*. This clutch controls the pulley which is belted to the cone pulleys *e* and *f*, the former driving the drum and headstock, the latter the table feed, the reverse being procured by means of the clutches *g* and *h*, Figs. 4 and 5.

To go into the details of the mechanism for changing the speed of the table feed, the lever *i*, Fig. 1, mounted on the shaft *j*, Fig. 4, moves the quill gear *k* from the position as shown, in which it drives the high speed series, so that it is out of mesh with the gear *l*, but is still engaged with the long gear *m*. The section of the quill gear marked *o* is brought into mesh with the gear *p*, keyed to *l*, from which, through a pair of gears, the table moves at reduced speed for the slow series. The change does not affect the relative speed of the table and the table hand wheel; the table always travels the same distance for one revolution of the hand wheel. When the knob *r* is pushed in a hand feed for the table is provided through the gears *q* and *p*, the knob engaging clutch teeth as shown. Not only does this movement of the knob connect the hand wheel with the table traverse gearing, but it also serves to stop the reversing of the table power feed. The knob may be pushed in at any time during the traverse of the table. Its movement brings the plunger *s* into contact with the clutch *t*, under tension of a spring. When the table reaches a reversing point the clutch *t* in starting toward *h* is caught in neutral position by the plunger *s* acting in groove *v* in clutch *t*. In this way the table is stopped automatically when the wheel is off the work, and the hand wheel is placed in operative connection with the table. During the power feed the hand wheel remains still because the clutch teeth which bring it into action are separated, as

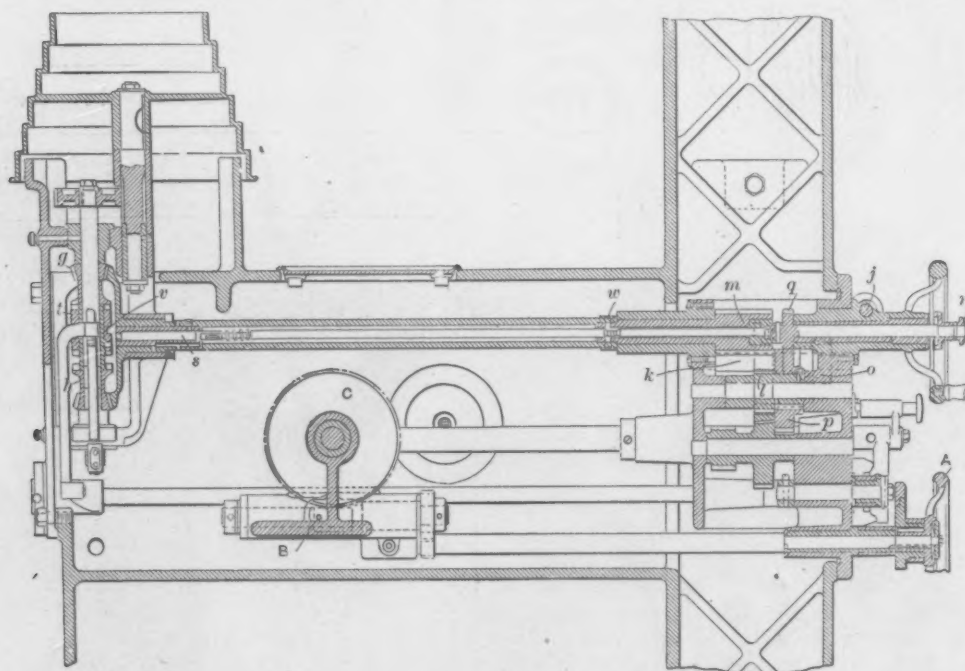


Fig. 4.—Plan View of the Machine, Showing the Feed Gearing for the Table Traverse.

wheel. Provision has been made for the rapid substitution of one wheel for another, the wheel being mounted in a sleeve on the spindle and the spindle in special spherical bearings which are self-aligning. The back of the machine has been widened out, making the tool more rigid, and the tank and pump have been inclosed.

Fig. 1 is a front view of the machine and Fig. 2 a rear view. Fig. 3 illustrates the overhead works and their new lever control; Fig. 4 is a plan view of the machine, showing the feed gearing for the table traverse; Fig. 5 is a detail of the reversing mechanism, and Fig. 6 is a section through the grinding wheel spindle, revealing the gearing for feeding the wheel toward the work.

The lever *a*, for starting and stopping that portion of

shown in the drawing. Thus the table hand wheel never reverses and can be made much larger, giving a more delicate control of the table traverse when feeding by hand in grinding to a shoulder. The knob *r* is held in whatever position the operator may place it by the plunger *w*, which operates in a groove in the connecting rod.

The automatic cross feed is of the type usually employed on Brown & Sharpe grinding machines, but with improved features. The hand wheel *A*, seen in Figs. 1, 3 and 4, is connected to the worm *B* through shaft and gears, and meshes worm wheel *C*, Figs. 4 and 6. The worm wheel connects with the shaft *D*, Fig. 6, through the clutch teeth *E*. This shaft has teeth cut in its upper

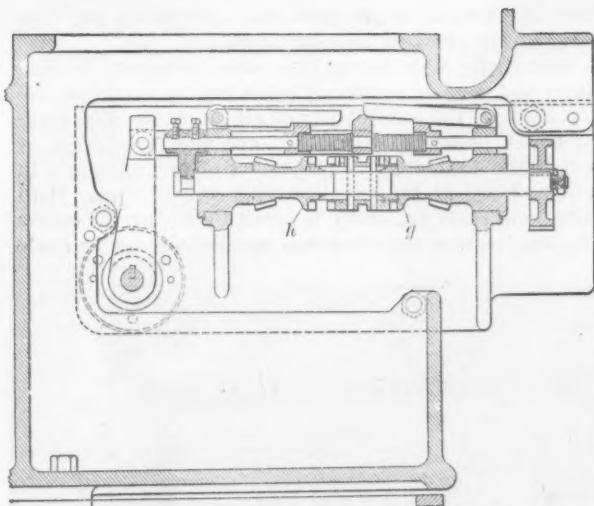


Fig. 5—Detail of the Reversing Mechanism.

end, meshing with the rack F on the under side of the slide G which supports the grinding wheel. The special new feature is that the lever H, Fig. 1, connects with the cam I, Fig. 6, through a shaft, the office of the cam being to raise the shaft D to which is pinned the clutch E. Raising the shaft by means of the lever operating

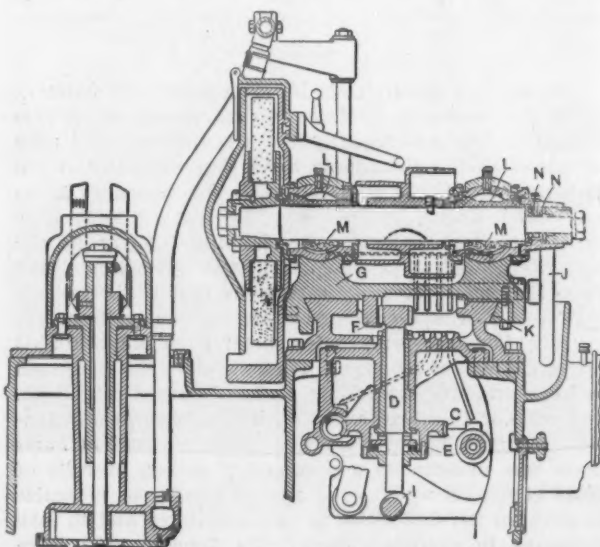


Fig. 6.—Section Through the Grinding Wheel Spindle, Showing the Gearing Feeding the Wheel to the Work.

the cam releases shaft D from the worm wheel and leaves the grinding wheel slide free to be moved quickly from one position to another through the agency of the hand wheel J, Figs. 2 and 6, a pinion fastened to it meshing the rack. The quick motion is of great value in depositing oil thoroughly on the sliding surfaces of the wheel carrying slide, and also serves to bring the wheel in position to grind when changing from one size work to another.

The system of gibbing the wheel carrying slide to its ways is shown at K. The gib is carefully fitted to its position and is not adjustable. If after years of service it is necessary to compensate for wear of the sliding surfaces, the gib can be removed and metal scraped from its upper surface, which would allow the bolts to draw it up higher in its seat, taking up any slack from wear without the danger of the operator clamping it so tight as to prevent the free movement of the wheel slide. The spindle carrying the grinding wheel is of one size throughout, and is exceptionally heavy for this size of machine. The oil chamber L leads around the bearing to the felt M, which provides an abundant lubrication for these very important bearings. The thrust of the spindle is taken by two convex washers N, which insures correct alignment. The headstock is exceptionally heavy and rigid, and an extremely wide belt is used for driving it. The machine rests on three bearings on the floor.

The water tank is very large, and the pump is of the vertical type used in all the grinding machines of the company.

To go into some of the details of specifications of the new machine, the spindle is of tool steel, hardened, ground and lapped, and has phosphor bronze boxes, self-aligning and with means of compensation for wear. It takes wheels to 16 in. diameter and $1\frac{1}{2}$ in. face. The transverse movement is controlled by hand wheel, and a dial is graduated to thousandths of an inch on diameter of the work. The automatic cross feed ranges from 0.00025 to 0.004 in. at each reversal of table, is easily and quickly set, and is thrown out automatically when work is to size. The swivel table turns on a large central stud, hardened and ground, with bronze bushing providing means of compensation for wear. It can be set at an angle to the table ways, the scale reading to $3\frac{1}{2}$ degrees and 8 in. taper per foot.

The speeds of the wheel and work and of the feed of the table are entirely independent of one another. There are six changes of spindle speed ranging from 1200 to 2400 per minute, and 12 changes of work speed varying from 42 to 312 rev. per min., together with 12 changes of table feed, from 8 to 100 in. per minute, in two series available for any work speed. The change from one series to another is through a simple lever movement without changing of belts. The tight and loose pulleys of the countershaft are 14 in. diameter, with 4-in. belt, the speeds being from 395 to 405 rev. per min. The floor space of the machine is 51 x 144 in., and net weight 5050 lb.

The Shuster Helix Coiling Machine.

A new machine, which coils wire of $\frac{1}{8}$ to $\frac{3}{8}$ in. in diameter, in helical coils of 4 to 30 in. in diameter and in lengths up to 16 ft., has been brought out by the

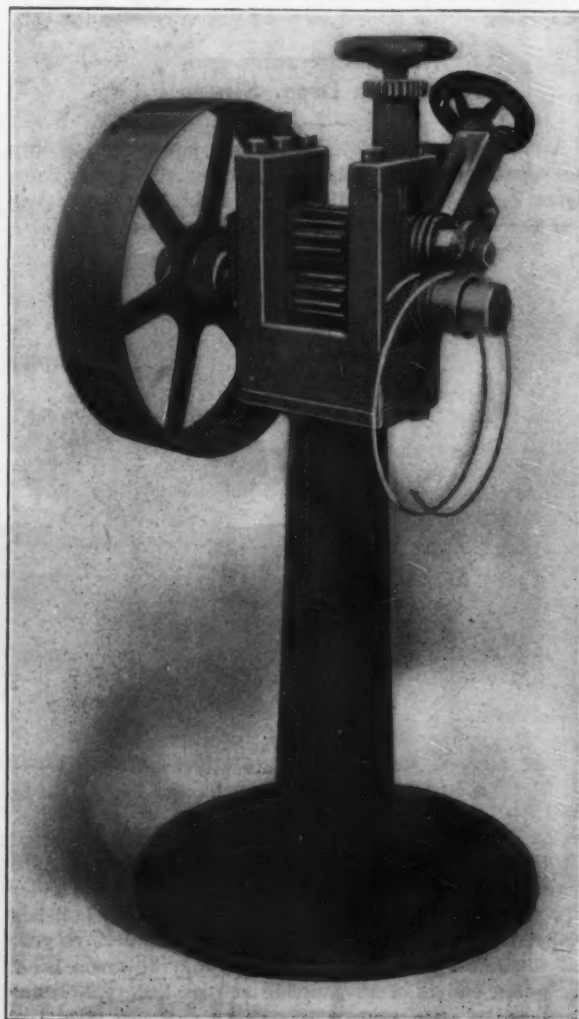


Fig. 1.—A Helix Coiling Machine Built by the F. B. Shuster Company, New Haven, Conn.

F. B. Shuster Company, New Haven, Conn. These coils are used in the building of columns of reinforced concrete. The machine may also be adapted for other purposes, such as the colling of tires for wire spoke wheels and barrel hoops, the wire having been cut to length before feeding into the machine.

Fig. 1 shows a pair of feed rolls mounted in a housing that feed the wire when pressure is applied through a hand wheel against a breaking roll, which is mounted in an adjustable slide operated by the other hand wheel.

carry the weight of plungers, thus preventing any tendency of the plungers to wear down.

The single style pump has some advantage in simplicity and smaller number of parts, but its particular advantage is in the accessibility of all its parts. The stuffing boxes, plungers, valves, &c., are more easily got at than in the duplex type. The valves of this pump are in pots, and are of the so-called "pot valve" type. Both valves and seats are easily removed by taking the covers off. The suction and discharge connections can be made

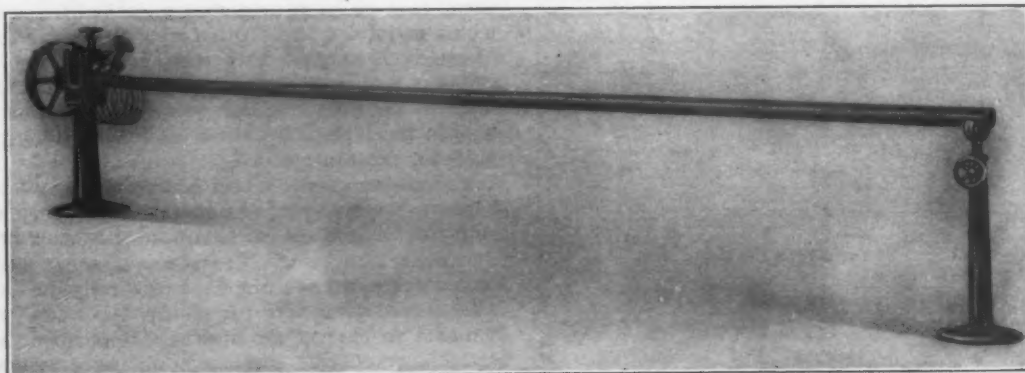


Fig. 2.—The Shuster Helix Coller Complete as Used When Coiling Long Helices.

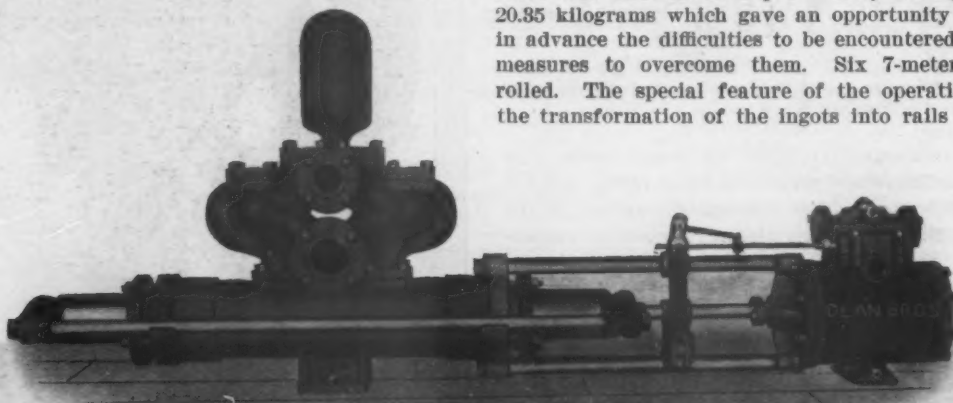
Adjusting the breaking roll closer to or farther from the feed rolls makes the diameter of the helix wound smaller or larger, as desired. On the lower feed roll shaft is a hub, upon which is a projecting pin, that acts as a lock for the pipe upon which the helix is wound, as shown in Fig. 2. The pipe is supported in a stand provided with rolls which permit it to revolve. The pipe being of the same diameter as the feed rolls and revolving therewith revolves the helix during its winding, which reduces the power required in the winding, as the feeding of the wire does not have to revolve the coil.

A New Dean Bros. Single Pump.

A new pattern single style plunger pump, having only one steam cylinder, is being built by the Dean Bros. Steam Pump Works, Indianapolis, Ind. The valve gear is of the builder's patent noiseless type with adjustable

from either side of this pump. This pattern is made for pressures up to 200 lb. per square inch.

Manganese Steel Rails in France.—In its January issue the *Revue de Metallurgie* reproduced an article from *The Iron Age* relating to the manganese steel rails produced by the Manganese Steel Rail Company at the Passaic Steel Works at Paterson, N. J. Schneider & Co. of Creusot, France, under date of February 6, 1909, write to our French contemporary claiming priority in the manufacture of manganese steel rails by rolling direct from the ingot. They state that the first trials go back to March, 1904, and consisted of rolling some rails weighing 7.5 kilograms per running meter from billets forged under the steam hammer. These trials were continued in February, 1905, by rolling, under the same conditions, two rails of 18 kilograms. In August, 1906, in anticipation of furnishing rails to the Metropolitan road of Paris there was undertaken a preliminary rolling of rails of 20.35 kilograms which gave an opportunity to recognize in advance the difficulties to be encountered and to take measures to overcome them. Six 7-meter rails were rolled. The special feature of the operation was that the transformation of the ingots into rails was effected



A New Pattern Single Style Plunger Pump Built by the Dean Bros. Steam Pump Works, Indianapolis, Ind.

stroke. By moving a stud up or down in a segmental slot the stroke of pump may be instantly shortened or lengthened. The frame connecting the pump cylinder with the steam cylinder is made of two heavy polished steel rods. The upper rod supports the steam valve gear and the lower rod acts as a guide for the cross head. The pump end is of the outside end packed type, sometimes called the trombone pattern. There are two plungers connected together by two steel guide rods. These rods run in guides lined with babbitt metal and

exclusively by rolling without preliminary forging of the ingots. Finally, from March to July, 1907, Schneider & Co. rolled 60 tons of the rails weighing 52 kilograms per meter and 6 to 12 meters long, which are now in service on the Metropolitan road of Paris.

While it is expected that plans for the new Quebec bridge will be completed in about six months, several years will be required to build it.

The Patch Steel Derrick.

A steel derrick of unusual size and capacity and containing interesting features of construction has recently been built by the F. R. Patch Mfg. Company, Rutland, Vt., for the Pigeon Hill Granite Company, Rockport, Mass. Fig. 1 shows this installation and Fig. 2

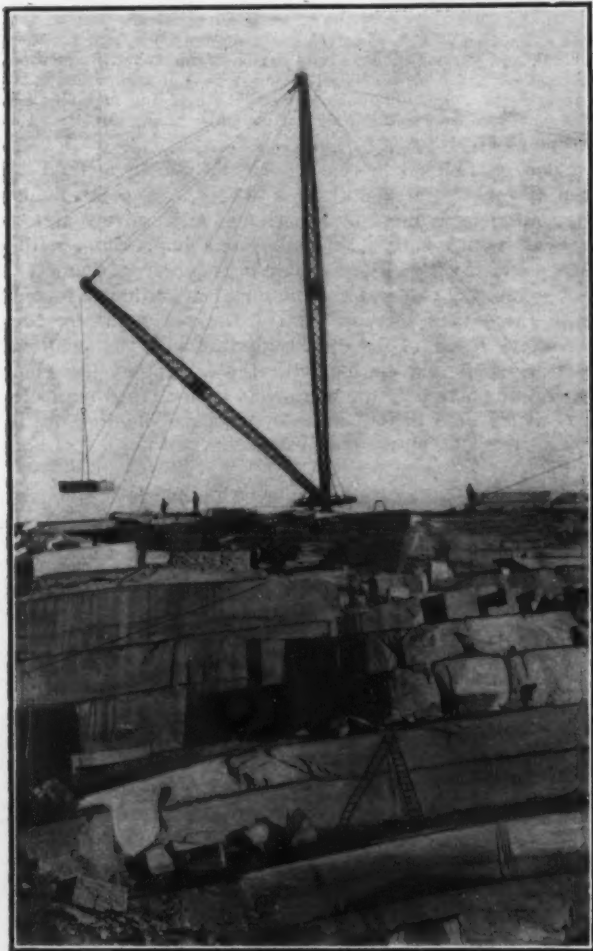


Fig. 1.—A 70-Ton Patch Derrick at the Pigeon Hill Granite Quarries, Rockport, Mass.

details of the arrangement of the parts showing the particularly novel feature in a derrick of the back block type, the running of the back block horizontally on a track on the ground, so that the hoisting height is not limited by the height of the mast. The rated capacity of the derrick is 70 tons, although it can probably handle safely twice that amount. The mast

is 110 ft. high and the boom 90 ft. long. Both are of structural steel, and all castings entering into the construction of the derrick are steel, with the exception of the sheaves and their bushings. All of the sheaves run on steel pins and bushings and are provided with special oiling devices, which is novel in derrick construction and is proving to be so advantageous that the builder is following this practice in all of its new derricks.

As may be seen in Fig. 2, the derrick is provided with a bull wheel, so that it may be swung by means of a special turning engine, and the boom is also provided with raise and fall, so that blocks of stone can be handled at any point within a distance of 15 ft. from the

bottom of the mast to the extreme end of the boom. The arrangement of the guys in pairs is another feature which, although not unusual, is not common and is proving very desirable in this class of heavy derricks.

The line for raising and lowering the boom, as may be seen, runs from the top of the derrick mast to a short mast placed back of the engine and over a sheave on top of the short mast down to the boom raising drum of the hoisting engine. The load line runs as a single line over the sheaves on the top and bottom ends of the boom, then over a second sheave at the base of the mast which maintains the alignment, allowing the derrick to be swung in a circle, to a carriage which runs on rails between the base of the derrick mast and the hoisting engine. The travel of this carriage may be as great as desired to secure the desired height of lift with any required multiplication of lifting force through the blocks and tackle connection between the hoist line and the hoisting engine. Between the rails on which the back block travels are rollers to support the slack of the fall line when it is being overhauled. The carriage is supported on four wheels running on the rails and on its axles are mounted the sheaves for the fall line. Guards around the sheaves prevent the lines from becoming disengaged, and to prevent the carriage from being derailed track locks extend downward from the carriage and engage under the treads of the rails, preventing either lateral or vertical displacement of the carriage.

For the overhauling or the return movement of the

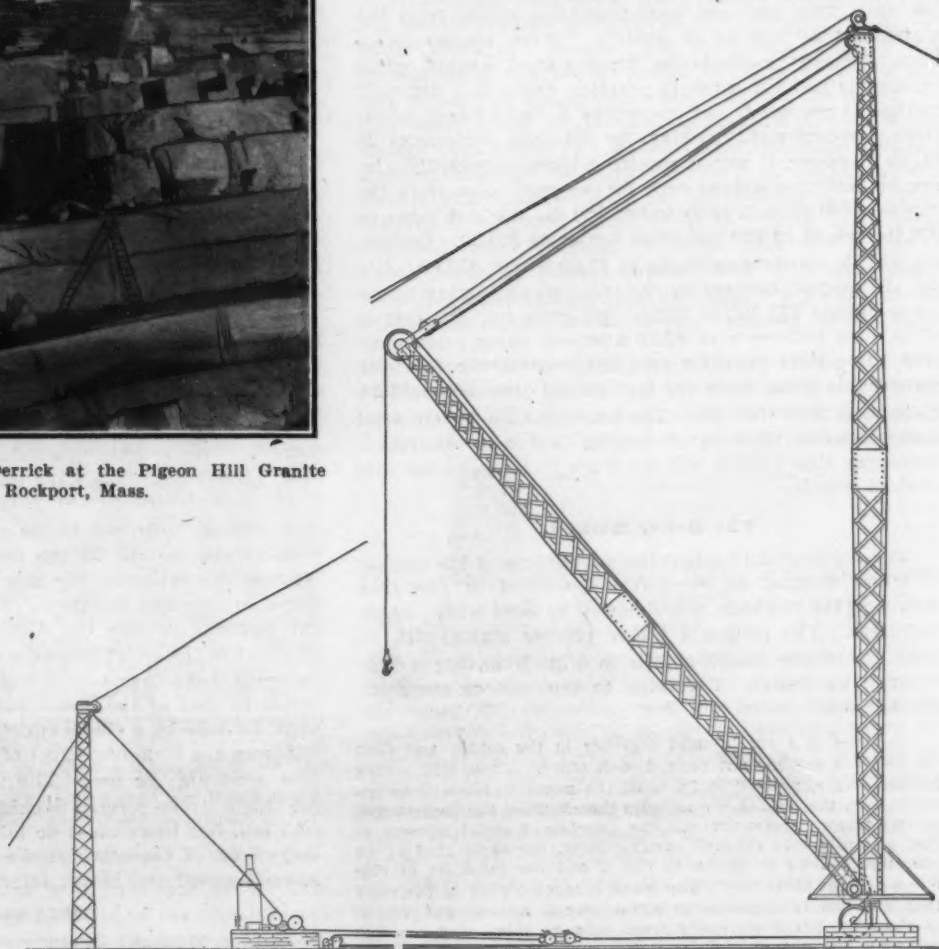


Fig. 2.—Details of the Improved Derrick Built by the F. R. Patch Mfg. Company, Rutland, Vt.

carriage, if the weight of the hook is insufficient, a positive overhauling action is secured through an overhaul line which is attached to the carriage and extends over a block placed near the base of the mast and returning to the winding drum. Usually it is attached to a part of the winding drum, which is of reduced diameter and winds in opposite direction to the fall line, so that the winding of the one is attended with the unwinding of the other, and the diameters of the drum on which the respective ropes wind are in proper relation, according to the multiple of the fall line, so that all ropes are held taut and the carriage is moved positively in either direction.

FORGING STEEL CAR WHEELS.

Advantages of a Proposed Method, Starting with a Small Ingot.—Wheel Wear and Rail Wear.

The April *Proceedings* of the Engineers' Society of Western Pennsylvania contains a paper presented by James H. Baker, Pittsburgh, before that society, under the title, "Car Wheel Forging and Conditions of Steel for High Service." In *The Iron Age* of September 7, 1905, Mr. Baker described and illustrated his method of forging car wheels, giving details of the machinery he had designed for that purpose. These illustrations and details were given also in his Pittsburgh paper, with the addition of considerable matter suggested by recent practice in forging car wheels. A synopsis of the address follows:

From 600,000 to 1,000,000 tons of car wheels are made per year. The forged steel wheel era is beginning. At first forged car wheels were made from steel of 0.60 to 0.70 per cent. carbon. Later as high as 0.80 per cent. carbon was used, and more recently 0.65 to 0.85 per cent. carbon, with manganese about the same. We shall go still higher in hardness and strength. Higher carbons will be used and safety will be secured by toughening the steel after it has been rolled. Recently the plan has been brought forward of casting wheels of steel ready for use. This does not seem promising either from the standpoint of cost or of quality. Three works use as many different methods for forging steel wheels, while another is just being put in practice, and a still different method is proposed. At one works a round blank is cut from a square slab. Taking, for instance, a circle of 28 in. in diameter, it would require a piece at least 28½ in. square, and this weighs fully 30 per cent. more than the circle. If the blank is to weigh 750 lb., the slab must be 975 lb., which at \$28 per gross ton costs \$12.20. Deducting 215 lb. recoverable scrap at \$1.60 leaves \$10.60. Under the method devised by the speaker, employing an ingot weighing 775 lb., at \$22.40 per gross ton, the cost is \$7.75, or a difference of \$2.75 a wheel, using prices current some time previous and not considering that the recoverable scrap from the last named process would be more than from the first. The heavy charge for material under existing methods of forging cannot be continued. Removing this burden will do much to promote the sale of steel wheels.

The Baker Method.

The speaker emphasized the advantages of his method of wheel forging, as heretofore described in *The Iron Age*, over the methods now followed by steel wheel manufacturers. The proposed Baker process starts with an ingot, *h*, of the shape shown in Fig. 1, having a hole through its center. Referring to the various steps the speaker said:

The dies *a a* are brought together in the center and then the dies *b b* are brought toward each other. These will, owing to their shape, proceed easily until the metal which will be imprisoned in the corners *c c* impedes them. Then the central dies are withdrawn somewhat and the imprisoned metal allowed to flow inwardly into the hub cavity. Next, the same kind of an operation follows as shown in Fig. 2 and the third set of dies follows in the same way. The blank is much higher at the start than the hub is to be, so no metal travels against the motion of the dies, but flows easily from between them, and the hub walls are lowered at each operation, thus giving a good finish. The direction the metal has been shown to travel is illustrated by the arrows in Fig. 3. The tread is, therefore, taken from the best portion of the ingot coming from between the lines *f f*.

Correct weight is of importance. Even when starting with the proper amount of material quite a difference may be caused by scaling. In addition to scaling the weight is apt to vary either in cutting the blank hot from an ingot, or in using individual ingots. By this method of forging the ingot can be weighed on its way to the dies and by the simple operation of the first set of dies, and incidentally some variation of power, more or less metal can be let into the hub cavity. This cavity half filled would hold about 30 lb. of steel. The tread portion comes from the best portion of the ingot, as shown in Fig. 3. For very fine work the ingot might be surfaced at its waist before forging. This general form of blank can be taken from a standard octagon ingot by forging. This forging should not be done by a press, but by a hammer of reasonable size, so that the

work may mostly be given to the surface which is to form the tread.

In changing these dies the blank is automatically left on the bars *l l*, shown in Fig. 2, as the lower die descends, and the dies are changed automatically. It is demonstrable that this method will not require over one-half the power used in present methods. And there is a vast difference between the cost and maintenance of a 3500-ton press and a 7000-ton machine, to say nothing of a 10,000-ton press.

The characteristic feature of the Baker method is that it forges the blank for a wheel to a point ready for rolling to a finish by a series of successively acting dies, of which each pair makes one impression, with-draws and is followed by a pair next larger in diameter, and so on. By this process the metal is gradually forced from the center or hub toward the periphery by the successive action of the dies, beginning with the smallest near the hub and ending with the largest at the rim. When one portion of the metal has been shaped by a die it is firmly held in that state by a pair of holding down

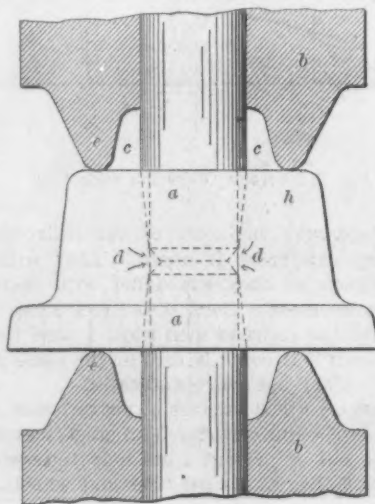


Fig. 1.—The Wheel Ingot and the First Operation with Dies.

dies automatically put in the place of the preceding one, thus preventing any of the metal displaced by the succeeding dies from flowing back into the part already reduced to the right thickness. In contrast with this, present methods involve the displacing of the entire mass of metal in the effort to produce the web, the metal being squeezed down in one operation from the thickness of the bloom to that of the web. Thus, not only must all this work be done by a single effort, but the resistance resulting from the clamping effect of the large die faces in action must also be met. The additional power required for single stroke forging is chiefly represented in a larger fuel bill, but there must be taken into consideration the large bulk of the machine, its unwieldy details and the more frequent and longer interruptions due to repairs.

DISCUSSION.

JOSEPH MORGAN: In studying this a year or two ago, I found that the Pennsylvania Railroad had about 200,000 freight cars, and, of course, about 1,600,000 freight wheels running. It is a very vital matter with them to have the wheels safe. Railroad people are very much concerned about the present cast iron freight car wheel. They say it has been much improved lately. It is impossible, however, to use cast iron under present loads of 100,000 lb. freight cars with the safety that engineers expect to have in the structures upon which life and property depend. Within a few days there was a freight wreck at Alegrippus on the main line of the Pennsylvania Railroad, where a train broke in two and ran down hill into another train and wrecked about 38 steel cars. Some had steel wheels, and I am told that out of the entire lot

of wheels examined but one of the steel wheels was cracked, a slight crack showing on the flange, while numbers of the cast iron wheels were badly broken. Of course the steel wheels may have been bent, but they did not break. When it comes to choosing between cast iron at 16,000 or 18,000 lb. ultimate, and steel at 150,000 lb., few engineers have much difficulty in making the choice. It is a matter of money. To replace a \$7 wheel with a \$15 or \$20 wheel will cost a great deal of money to any railroad, but it is a necessary change, and will be made

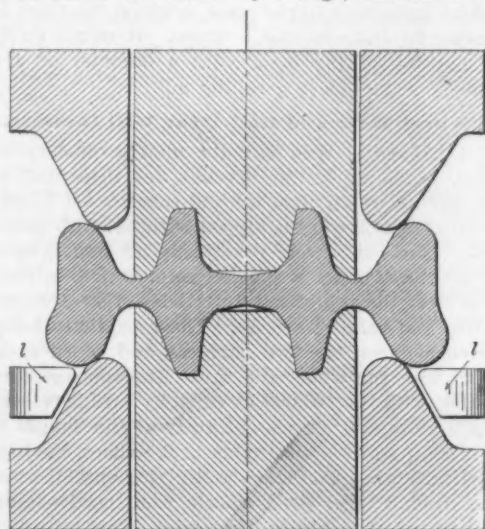


Fig. 2.—Second Operation with Dies.

by the wide awake engineers of our railroads just as soon as they can bring it about. They will do with cast iron wheels as they are doing with their wooden passenger cars—replace them with steel ones. I do not believe any of the railroad men want a steel tired wheel for freight even if it could be had at the same price as a solid wheel. They are too complicated.

G. L. NORRIS: For a number of years I was connected with a company manufacturing both steel tires and rolled steel wheels, but at present I am only interested in the possibilities of alloy steels for tires and wheels. I think these are the steels that will give the greatest service. The rail of to-day is very much harder than the rail of a few years ago, and this, no doubt, has an effect on the rate of wear of the wheel. We cannot very well make the steel in the tires or the wheels much higher in carbon with safety, so the only resource seems to be to use the alloy steels, and I believe the most suitable one for the purpose is a chrome vanadium steel. This is being tried at present by several railroads and the results, I understand, are very good. Mr. Baker's method of making the wheel is very interesting, but I would like to know whether he expects to cast this blank as a short ingot or cut it from a long ingot. I think if he casts it as a short ingot he will get into a good many of the troubles that he has criticized in some of the other methods, notably piping and deep seated gas cavities.

The Form of the Blank.

JULIAN KENNEDY: There is a good deal of truth in Mr. Baker's statement that the tread of the wheel should be worked as nearly as possible in the same manner as the steel bar is worked, in one direction. In regard to the short or individual ingot, I have always felt that it is condemned more than it deserves. There is apt to be a little piping in an ingot, and if it is cast hollow it becomes an annular pipe running between the axis and the outside; but I imagine that would not make such a very bad wheel after all. It would probably make a better wheel if the ingot were cast solid and the center punched out. At the same time, for high grade wheels, little difficulty can be caused by casting a long ingot and cutting off and discarding the orthodox 30 per cent.

Mr. BAKER: In relation to the short ingot, that was placed there for the purpose of illustration. The form

of the ingot is for the steel men to decide. I wrote an article for *The Iron Age* describing a method of forging wheels from a long ingot. I think you will all agree that when an individual ingot is used to make a steel tire nearly the whole of that ingot goes out into the tread. When an ingot of the kind shown in Fig. 1 is used to make a steel wheel the top and the bottom go back into the inner part of the wheel, and, as the marks on the sample of our experiments show, the tread comes out of the waist.

SAMUEL DIESCHER: The points to be considered are, which is the best of several processes now followed and also whether such a wheel should be made from an ingot cast upright or from a slab rolled from an ingot containing whatever flaws may have been in that ingot. The different qualities in the same slab at various places have their effect upon the resistance to wear in the tread and flange of a car wheel. They will be most conspicuous in the direction of two diameters drawn at right angles to each other, the one in the direction in which the slab was rolled and the other transverse to it. In the ingot Mr. Baker uses for making wheels the tread is made from the portion of the ingot that is situated between the top and bottom, hence usually free from flaws. The central portion of this ingot is cast with a hole through it. For these reasons it appears to me that the process of Mr. Baker is far superior to any that I know of.

Flange Wear.

A. STUCKI: Increasing the hardness of the rails, as Mr. Norris suggested, would be still more severe on the wheel tread and flange. The conditions under which wheels ordinarily are compelled to run are very severe, and, strange to say, unnecessarily so, and the sooner we quit using them as grindstones against the rails the better. The Pittsburgh & Lake Erie Railroad Company and a few other roads in the last 8 or 10 years have done a great deal of good in this direction. The road mentioned equipped about 8000 cars with frictionless side and center bearings, so as to allow the trucks to swivel freely in passing curves. The other cars, about 7000, had the ordinary side bearings. A record of the wheel performance for three years showed that on these

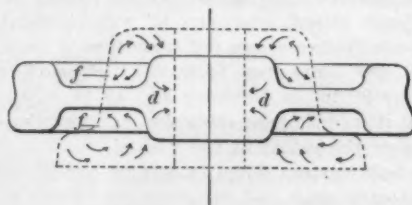


Fig. 3.—Showing How the Middle Portion of the Ingot Goes to the Wheel Tread.

two lots of cars the wheels removed on account of worn flanges were 2 per cent. in one case and 30 per cent. in the other for the same cars, the same road and the same service. On one lot of cars in passing a curve, the side bearings rub hard on each other and prevent the trucks from swiveling, pressing the outer front wheel against the rail and keeping it grinding against the rail until the curve is passed, while on the other lot the trucks can swing freely and the wheel flanges simply act as safety guides to keep the wheels from running off. Fortunately the expense for antifriction side bearings is a mere trifle in comparison with the expense connected with a forged or rolled wheel, and a good many roads are now taking this question up very vigorously and in building new cars will not tolerate the old conditions.

G. L. NORRIS: I do not wish to be understood as advocating hard rails. It is simply the condition that has come about in the last few years. The rail is as hard or harder than the tires and wheels to-day, and that is a condition which the tire and wheel maker have got to meet in some way to obtain the mileage demanded by the railroads. Mr. Stucki's point is well made. I know a road where 89 per cent. of the wheels removed are for cut flanges.

Results With Wheels as Now Forged.

H. H. ANDERSON: [In reply to this speaker's inquiry Mr. Baker said that no full sized wheels had been made by his process.] Such being the case, it is difficult to determine what the results will be. Actual service conditions are the only tests of the qualities of a wheel. While we have encountered difficulties, as would naturally be expected in such a radical departure from beaten paths, still what have been brought out by Mr. Baker as the weak points in the manufacture of a wheel from a slab do not deserve the prominence given in the paper. They are not borne out by actual service. From tests made of the steel in various wheels and tires purchased in the open market, we found that the Schoen wheel was harder and showed greater resistance to abrasion than any of the others. The mileage, which is the important factor with the railroads, shows a total without turning of 184,539 miles for 0.348 in. wear with a wheel load of practically 13,000 lb. On tender truck service, which is the hardest to which wheels are subjected on steam railroads, we show 25,405 miles per 1-16 in. wear. On street cars, where we have the grinding due to the grit and sand on the rail and brake action due to the numerous stops, we show 10,000 miles per 1-16 in. wear. From the figures given, all obtained in actual practice, I feel that our claim that the wheel has given exceptionally good satisfaction is substantially confirmed. The figures given in the paper as to the weight of steel required and the amount of scrap taken from the slab are higher than found in actual practice. In regard to the piping in the ingots from which these slabs are produced: This is taken care of by a liberal discard from the section of the ingot where the piping or segregation is liable to occur, as it does to a greater or less extent in all ingots.

S. S. WALES: Some time ago I took up an examination of the Schoen wheel. It showed that in a wheel made from a slab are found four distinct points, two on opposite sides, where is found the good portion of the ingot, and two on opposite sides and at right angles to these, where is found the piped or segregated portion of the ingot. To determine the extent to which these points of difference exist, three distinct groups of wheels were taken, one of standard Schoen wheels made from slabs and one of experimental Schoen wheels made from a long ingot sliced, and one of experimental Schoen wheels made from sections cut transversely from a bloom and upset in a large press to form a "cheese" or biscuit, these being 20 in. in diameter and 10 in. thick. At the beginning it was thought desirable to know the direction of rolling of the metal in the "slab" wheel, and, therefore, the hub was cut down to several depths and etched with acid each time, but the direction of the fiber could not be determined definitely.

All of the wheels comprising the above groups were cut into 12 segments and from each segment six pulling tests were cut, $\frac{1}{2}$ in. in diameter by 2 in. between punch marks. Two tests were taken from the flange region longitudinally, two from the tread longitudinally and two from the tread transversely to the circumference of the wheel. From all these were obtained tensile, elastic, elongation and reduction tests, and around the wheels made from the slab there was a maximum of, I should say, 6 per cent. variation in the tensile and other properties. As far as tensiles and elastics went we could find hardly any indications of the fact that one set of wheels was made from slabs and the other made from a "cheese," the original structure having been almost entirely obscured. Further, by giving these wheels a heat treatment the slight indication, if any existed, disappeared. This would indicate that the work done on the tread practically eliminates any difference one would get in the original slab.

The point I want to make is that in taking these longitudinal tests continuously around the tread, as described above, we are bound to cross the zone where the middle portion of that ingot was, and we are bound to cross these better portions, and that in these investigations no such points were indicated by the results obtained. We have made some experiments in treating wheels and it is entirely possible to make a wheel that

would wear out any rails now in service, but I would not recommend using as hard a wheel as that.

MR. KENNEDY: If you were going to make wheels which would you prefer, slabs or slices across the ingot?

MR. WALES: I do not know that I would care to go on record as to which I would prefer to use, as I was simply making the point that the wheel was not noticeably uniform when made from the slab, as has been supposed; but I do not consider that we would care to make a wheel out of cast blanks with the other methods available. It would be preferable to put some work on the piece before beginning to make it into a wheel. It might be only a light working of the ingot with a hammer or a small amount of reduction in a rolling mill.

Wheel Wear and Rail Wear Will Increase.

F. D. WARD: I was with the underground system of London, promoted by Mr. Yerkes, for three and a half years, during which time we had constructed about 1000 cars, all of which were equipped with built up steel tired wheels. The roads were practically all underground, in tubes sheltered from wind and rain, which in the open tend to clear the rail of small particles of steel worn from the tires and rails in service. These particles act as an abrasive between the two surfaces and cause excessive wear to both the wheel and rail. The tonnage was low compared with the 100,000 lb. capacity cars here, but still the rails wore and wheels cut away at the flanges badly. We got some relief by changing brake shoes, having used a practically gray iron shoe, and giving special attention to the track. Steel tired wheels were used exclusively and I am of the opinion that when steel wheels come into universal use and the hard surface cast iron wheels are discarded the wear of rail and wheels will be greatly increased, as the chilled wheels now in service tend to keep the rail in a smooth planished condition. The action is like a grindstone. The small particles of steel act like sand between the two surfaces, and this is much worse where the track is sheltered and the rails cannot be cleaned off by rain or air currents. I experimented with hard and soft tires in elevated service in Chicago, the tests extending over a period of two years, and found soft tires showed less wear than hard ones. I also tested the same type of tires in England, with the same results.

Contact of Wheel With Rail.

HARRY J. LEWIS: The most important point in the car wheel is its contact with the rail. With a journal bearing of, say, $5\frac{1}{2} \times 10$ in., or about 55 sq. in., the rail head is about $2\frac{1}{2}$ in. wide. I have asked my railroad friends about the area of bearing between wheel and rail and they agree fairly well that it is not over 1 sq. in. The gross weight of a loaded 50-ton car is about 150,000 lb., which divided among eight wheels is 18,750 lb. per wheel. If the 1 sq. in. of contact area is correct, we have 18,750 lb. per square inch on a bearing which is not uniform, but most intense under the center of wheel and diminishes to zero at the forward and rear edges of contact. This load is suddenly applied and removed and often repeated. The question is whether we would design any other engineering structure and use the same unit strains as probably occur between wheel and rail. It is my impression that the elastic limit is often exceeded in this contact, as the outer edge of the rail head often shows a slight fin which has flowed out from under the tread. The problem now before the rail maker appears to be the making of a rail hard enough not to flow in the head, and sufficiently stiff and tough to carry often repeated and suddenly reversed loading. This appears likely to result in a rail head of increasing hardness, and if we oppose this hard rail with a hard wheel tread the two are likely to grind each other to pieces. May it not be true that a part at least of the solution lies in a soft, tough wheel tread which can endure sufficient deformation to allow the distribution of the bearing over a reasonable area?

JULIAN KENNEDY: The soft rail will distort just the same as the hard one under a given load. As long as it is within the elastic limit I do not think 100,000 lb. on a soft rail will affect it any further than the hard one. After we get beyond the elastic limit we simply roll the head off the rail. I think a great deal of this question of

wear is a question of material. A hard steel slide on an engine cuts a hard steel bar and goes to pieces. At the same time on a rail of different temper the train will not grind as much when it comes to flange friction. I believe a great deal can be done by having the trucks swivel well, and I believe they would run better if there was more taper on the wheel and more clearance between the flange and the rail. I believe with a little more coning and more leeway between the flange and the rail, wheels would run over most of our roads without the flange ever touching the rail, if they swiveled sufficiently. I believe if the ties were spotted so the rails could be converged and the wheels made with more coning and at least $\frac{1}{4}$ in. more clearance, we would have much longer life in the wheel. Another thing is to take the brakes off the wheel. In some places they are now discussing using a separate rim for the brake.

JOSEPH MORGAN: As to increasing the cone, I think that has been done by the railroads within a few years. When they got into trouble with the heavy cars and cast iron wheels they did increase the coning, which helped the wheel somewhat, but the trouble is the wheel load seems to be too great to carry 100,000-lb. cars upon cast iron wheels.

H. H. ANDERSON: George L. Fowler made some exhaustive experiments showing only 0.25 sq. in. of contact of wheel with rail with 20,000 lb. pressure. With loaded cars, if they stand on the rail a certain time, a deformation of the rail is perceptible, conforming to the contour of the wheel. In regard to the coning of the wheel, some experiments were tried on a certain road of increasing the coning from 1 to 20 to 1 to 13, to take care of the 100,000 lb. capacity cars, but even then, when such wheels begin to wear, after a certain length of time the coning is altogether taken away and they get into a groove. We find a good deal of flange wear, especially unequal flange wear, on different wheels on the same truck, and that is due very frequently to the axles being out of line. That has been one common source of flange wear. The roller side bearing Mr. Stucki spoke of has been tried on one of our local roads with considerable success in taking care of flange wear. But when we see cars go along with unequal load and down on the side bearings on one side, it stands to reason that excessive flange wear will occur on some of the wheels.

The Pacific Northwest.

SEATTLE, WASH., May 17, 1909.—Activity in the construction and improvement of railroads throughout the Pacific Northwest and in other lines with which the metal trades are concerned is unabated. It is evident that the completion of the Chicago, Milwaukee & St. Paul extension to the Coast (under the name of the Chicago, Milwaukee & Puget Sound) and of the Harriman lines to Puget Sound is the initial rather than the final step in an era of railroad building unprecedented in this part of the world.

A few days ago a bond issue of \$100,000,000 was announced by the Chicago, Milwaukee & Puget Sound, most of which is expected to be used in financing the immediate construction of 1000 miles of branch lines and feeders for the transcontinental traffic. The Hill, Harriman and Milwaukee systems are engaged in a sharp struggle to gain all the vantage points in this rapidly developing region. The Hill interests have let contracts for improvement of the main line of the Northern Pacific through North Dakota and Montana, calling for the expenditure within the next two years on that work of about \$16,000,000. This is to put the road in shape to compete in fast train service with rival roads. Each system is ready to begin the invasion of the Olympic Peninsula, that rich, undeveloped timber belt between Puget Sound and the Pacific Ocean.

In Alaska the Copper River road is being pushed as rapidly as practicable, and work on the Alaska Central under direction of the receiver is to be resumed.

In Seattle the building permits since January 1 have been unprecedented in number and value, aggregating a total of nearly \$2,000,000 per month.

The Alaska-Yukon-Pacific Exposition, which opens at Seattle June 1 and continues until October 16, seems to occur at the opportune moment for directing the attention of the nation toward this section, which is stepping into greater relative importance than it has ever before enjoyed.

The steel stacks for the Irondale furnaces, among the largest ever made on the Pacific Coast, have been completed by the Moran Company of this city. Machinery for the bar mill and tube plant, purchased in the East by James A. Moore, has just been shipped. The largest engine will have a capacity of 1000 hp., the second of 600 hp., and the third of 400. The boilers will be built by the Moran Company, in whose plant the steel castings are also being made. It is expected to start the Irondale mills by October 1 with a capacity of 150 tons of bar steel per day. President Moore says he has under consideration a proposal from Boston capitalists to unite in organizing a corporation to turn out modern steel street cars; the project is for the two plants to join each other.

The first through freight dispatched for the Pacific Coast over the Milwaukee road is now on its way. The shipment consists of company merchandise only and comes from Chicago. General freight services may not be inaugurated before July 1. The Puget Sound extension recently let a contract to the Brooks Locomotive Works for 13 passenger engines to be used exclusively in the Western service. No doubt remains as to the purchase by the Milwaukee of the Tacoma & Eastern. Ten days ago the contract was let by the new road to H. C. Henry for the construction at a cost of \$1,000,000 of the link between Gate City, on the Grays Harbor extension, and McKenna, on the Tacoma & Eastern. This will afford a new entrance to Tacoma from the jointly owned Harriman-Milwaukee Grays Harbor extension, in addition to that to be gained through the Union Pacific tunnel. Track laying and warehouses for the terminal yards at Tacoma are being rushed.

The steamship Seward, which left this port the latter part of April with a cargo of materials for the Copper River road so heavy that the underwriters feared for her safety, reached Cordova and discharged her freight without mishap. The shipment included 50 carloads of steel for the second bridge over the Copper River, 1000 tons of rails, two heavy locomotives and other freight. Some definite announcement is anticipated in the near future as to the expected construction of the road from Cordova to the Bering Lake coal fields by the Copper River & Northwestern.

The Moran Company recently turned out the first steel street car ever built in Seattle. It was made for the Seattle, Renton & Southern under the invention of Charles H. Anderson of Seattle, who claims that it is the lightest of its kind manufactured. Seven more are to be built for the same road.

W. T. P.

The Freeport Wind Mill & Gas Engine Company, Freeport, Ill., with a capital stock of \$50,000, has erected a plant on a tract of land adjacent to the tracks of the Chicago, Milwaukee & St. Paul Railroad in East Freeport. The buildings, consisting of a foundry, machine shop, wood working and pattern making shops and offices, have been erected and equipped. O. J. Ziegler, formerly superintendent of the Stover Mfg. Company, is president; Paul F. Schryer, until recently vice-president and superintendent of the Stover Engine Works, is vice-president, and R. M. Bennethum is secretary and treasurer. In addition to the manufacture of wind mills and gas engines, the company will operate a job foundry for light and heavy gray iron castings.

The National Railway Devices Company, lately incorporated with a capital stock of \$200,000, has established offices at 400 Old Colony Building, Chicago. The leading specialties which it will manufacture are the Schroyer uncoupling apparatus, the Shoemaker pneumatic firebox door operator, the Dohlin automatic freight car door fastener and the Turnbull driving wheel flange lubricator.

Whitney Roller Bearing Industrial Car Wheels.

The use of roller bearing wheels on industrial and mine cars, instead of solid hub wheels, means less haulage power necessary to move the cars and increased facility for handling them, because of the reduced friction. Roller bearing wheels require less lubricant than wheels with plain bearings, but to obtain long service and eco-

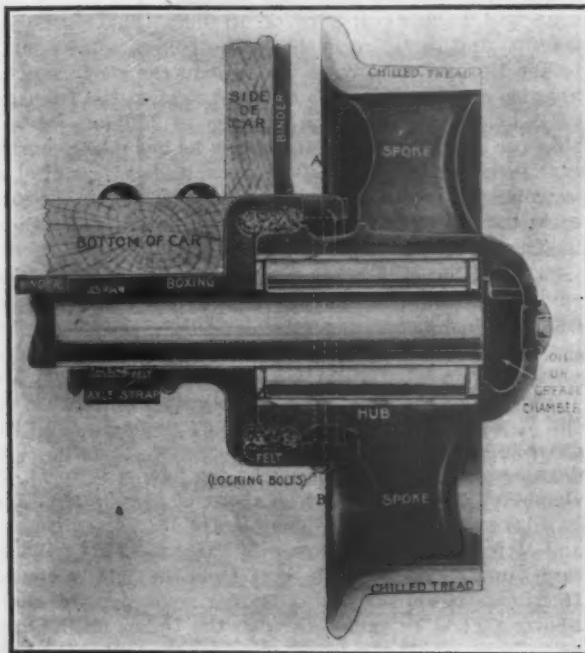


Fig. 1.—Axial Section of the Whitney Roller Bearing Wheel Made by the Sanford-Day Iron Works, Knoxville, Tenn.

nomical returns from them it is necessary that they work under conditions in some respects different from those for solid bearings. Probably the most important consideration in the design of a roller bearing wheel is to insure that grit and foreign matter be kept from the rollers. Other considerations are the material of which the rollers are made, the length and location of the rollers in reference to the load, and the nature of the surfaces against which the rollers run. The races should be of greater density than the ordinary cast iron hub of the cast wheel.

The Whitney roller bearing wheels recently perfected by the Sanford-Day Iron Works, Knoxville, Tenn., are claimed to have been thoroughly tested out and to have been found efficient and economical for general mine and industrial use. The construction of the wheels is shown in the accompanying illustrations.

As shown in Fig. 1, the wheel itself is a single solid casting with no loose caps bolted or riveted to it. At the front the hub completely incloses the end of the

axle and rollers, and at the rear the hub extends back into a boxing packed with compressed hair felt. This construction keeps all grit from the rollers and prevents the escape of lubricant. An additional ring of felt, in the pedestal, incloses the axle and prevents the oil from working along the axle and keeps the grit from working in.

The wheel is held on the axle to gauge by two locking bolts, Fig. 2, which pass vertically through the pedestal and engage in a groove turned in the rear hub of the wheel. There is little friction on these locking bolts, for the pressure around curves is taken by the wheel flange and the thrust of the wheel hub against the pedestal and the locking bolts merely serves to keep the wheel from working outwardly on the axle. After several months' service the locking bolts were merely polished at the point of contact with the hub. The wheel hub is lined with a split tube made of high carbon spring steel, one of which removed may be seen in Fig. 3, and the rollers work between this lining and the steel axle. The steel lining is split diagonally, so that the rollers never rest on a crack, and it is claimed that the linings will wear for years. A new lining can be easily inserted when necessary. The rollers are practically the only parts subject to wear, but are so protected that they have long life and are long and large. The center of the rollers is located under the gauge line of the wheel, thus putting the load over the center of the bearings, which prevents the tendency of the wheel to wobble or cut the rollers or the axle. The rollers are held parallel in a single piece cage, which is not subject to wear, as it merely revolves around the axle carried by the rollers. The rollers are loose in the cage and can be replaced separately and easily. It is claimed that the wearing parts of the

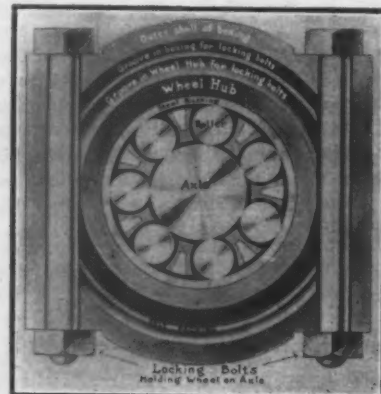


Fig. 2.—Cross Section of the Whitney Roller Bearing.

wheel are so limited that the upkeep should be considerably less than that of the ordinary solid hub wheel. The tread of the wheel has a deep chill, which prolongs its life.

In taking the wheel off the axle it is merely necessary to lift out the locking bolts. The wheel gauge is regu-

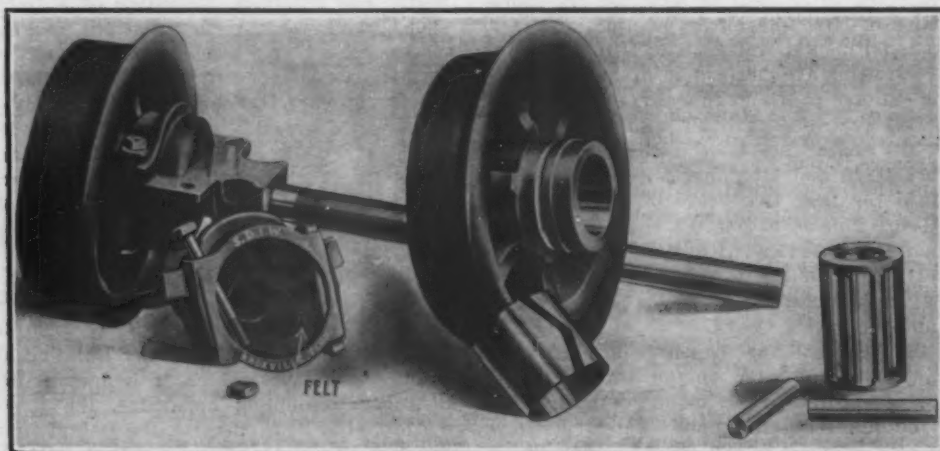


Fig. 3.—Axle with One Wheel in Place and the Other Unassembled.

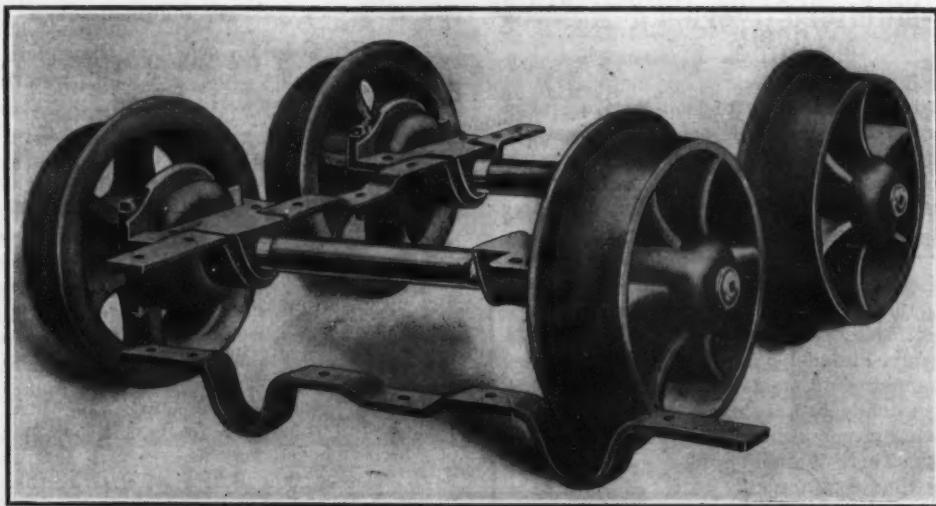


Fig. 4.—Whitney Roller Bearing Wheels Ready for Bolting to a Car.

lated by the position of the pedestal boxing on the car bottom. When this pedestal is in the proper place it is bolted to the car bottom and then a steel axle strap runs over the top of the pedestal from one axle to the other and holds the truck rigidly in place and keeps the axles constantly parallel, as shown in Fig. 4.

The saving of haulage power and lubrication is estimated as sufficient to pay the extra cost of the wheel several times over each year. The wheel can be run through water or sand without affecting the journals, and the wheels and axles can be used on any old axle having a smooth steel journal of the proper diameter.

A test of the draw pull required to start a car equipped with roller bearing wheels, compared with that required to start an easy running solid hub car, was made at a coal mine. The mine car with the roller bearing wheels had been in service about four months, and a spring scale was used to make the test. On the same section of track 24 lb. pull was required to start the roller bearing wheel car and 50 lb. pull to start the same car equipped with easy running solid hub wheels. The rollers of the wheels had not been lubricated for two months and on examining the supply of mixed grease and oil on the rollers it seemed to be practically undiminished. It is the opinion of the company that the Whitney wheels will not require lubricant oftener than once in six months. To complete the test some of the rollers were compared with new ones and showed no perceptible wear. The manufacturer guarantees all wearing surfaces for one year if they are properly lubricated and under normal service, a reduction of draw bar pull when compared to a solid hub wheel of at least 25 to 40 per cent., and that the oiling need not be oftener than six times per year.

New England Factory Power.

The utilization of New England's water power has proceeded rapidly during recent years, but only the beginning has been attained as compared with the available sources of supply, especially for long distance transmission. It looks as if the period of development on a large scale has now arrived. Many projects are contemplated, which are of various degrees of importance. The public sentiment existing against the high voltages of long distance transmission lines has diminished with greater familiarity, and in the cities and larger towns cheaper methods of underground installation of wires have added to the attractiveness of this source of power.

Inland industries of New England have to pay high prices for coal because of the cost of hauling from tide-water, or over the all rail routes, and the use of electricity has cut the cost of power very materially where it has been developed along modern lines. Engineers interested in the introduction of electric power producing plants along the Maine coast, utilizing the wide extremes of tides to turn water wheels, have hopes that they will eventually give New England an unlimited supply

of power. In the meantime that section of the country can be profitably cultivated by those who manufacture or sell equipment and supplies for hydraulic power stations. It should not be lost sight of that the growth of industry resulting from hydro-electric developments is also stimulating to the steam engine and boiler business, because the streams of New England are uncertain quantities at times. During the periods of drought reserve steam plants must be available or else industry must come to a standstill.

The Pennsylvania Corporate Tax Commission.

HARRISBURG, Pa., May 26, 1909.—The special legislative commission to investigate the corporation tax laws of the State and report a bill to the Legislature of 1911 will shortly begin an inquiry into the subject of corporate taxation and its relation to State revenue in Pennsylvania that will be of importance to every manufacturing company doing business in the State.

Pennsylvania now exempts the manufacturing companies, which include the numerous iron and steel and kindred companies, but for the last three or four legislative sessions efforts have been made to tax them at the rate of 5 to 10 mills on the dollar. It has also been proposed to tax increases of capital and bonds for additional sums; to require manufactured gas companies to pay a tax equal to that imposed on electric companies and to increase the income of the State by providing for a heavy bonus on loans of street railroad companies. All of these projects will be taken into account by the commission, and it is probable that abundant opportunity for hearings will be afforded. The commission has wide powers in its inquiry, especially in regard to obtaining information from officers of companies, and will be assisted by the fiscal officers of the State.

It is recognized that if Pennsylvania is to go on appropriating millions of dollars biennially for hospitals, homes and other charities in addition to providing \$15,000,000 for common schools, there must be either a curtailment of expenditures in other directions or an increase in revenue. This year appropriations were made in excess of \$67,000,000, with less than \$50,000,000 of revenue in sight for two years. In order to maintain appropriations for educational and humanitarian objects, as well as to conduct the State government, it was necessary for the Governor to reduce heavily the proposed appropriations for construction of various public works and to veto others of State wide importance.

These facts will be taken into consideration by the commission, whose object will doubtless be to adjust the burdens of taxation as equitably as possible. The membership of the commission is representative chiefly of the Philadelphia and Pittsburgh districts, the other member being from the iron making county of Lebanon. The commission is to report its taxation measures to the Governor six months before the next session begins in January, 1911.

A. B. H.

The Curtis-Mumford Overhead Molding Machine.

That the molding machine is to have a larger place in the main bay of the foundry is one of the most significant indications of its recent development. The bringing out of the Curtis-Mumford "overhead molder," first exhibited at the American Foundrymen's Association convention last week, represents an important move in this direction. Combining roll-over and pattern draft with crane and hoist service, this machine meets conditions which are thus referred to by its joint promoters, the Curtis & Co. Mfg. Company, St. Louis, and E. H. Mumford, Company, Philadelphia:

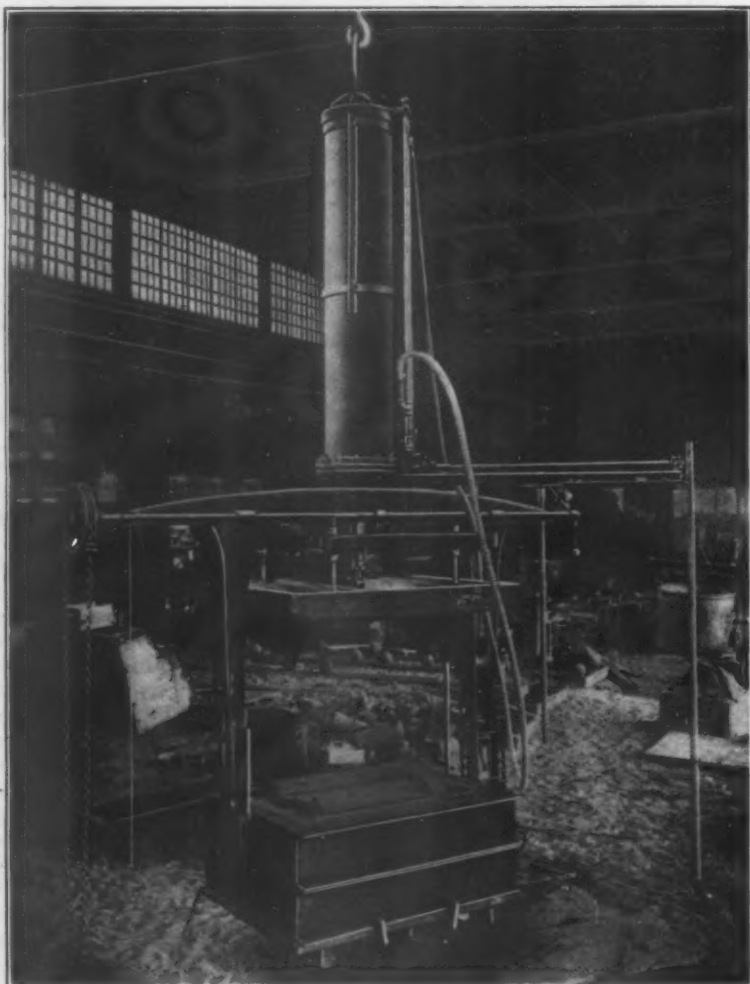
"The jolt ramming of molds has extended to such sizes of molds as finally to have exceeded the capacities of pattern drawing mechanism fitted to machines of the roll-over variety. There is another reason why the drawing of patterns by gear forming a part of the machine is not desirable, and that is that the vibration caused by the rapid, heavy blows of the jolt rammer is destructive of the accurate mechanism necessary to the pattern drawing process. Another reason still is that the fastening of patterns to the machine proscribes the picking up of follow boards and patterns at random, as they are prepared by laboring gangs for ramming and drawing. Again, a hoist or crane of large capacity is an essential adjunct of large jolt ramming machines and its constant attendance is required by the exceedingly short time consumed by the jolt ramming process."

The machine shown at Cincinnati is one having a capacity to handle molds 6 ft. x 8 ft., weighing not more than 9000 lb. when supplied with 70-lb. air pressure. It takes a follow boarded pattern with the flask upon it filled with sand on the floor, raises and transports it to the table of the jolt rammer, whence, after the ramming, it lifts it and while removing it to the floor rolls it by power with absolute smoothness and draws the pattern while the mold is suspended. The method by which this is accomplished will be understood on reference to the illustration, in which the large cylinder shown at the top of the machine is the main lifting hoist, raising the cross rail from which depend the two hangers. It is this large cylinder which gives the machine its capacity of 9000-lb. lift. When a foundry crane of large capacity is available the machine is limited only by the size of flask and the large cylinder at the top is not required. Below and projecting from the bottom of the large cylinder is what appears to be a plunger of this cylinder.

This is the pattern drawing cylinder proper, the plunger of which carries the four-armed cross, from which four small spuds depend. These four spuds may be moved readily in slots, and are never rigidly tightened. They are slid to such a point on the back of a pattern or follow board as they may find a resting place upon during the pattern drawing operation.

While the mold is suspended in the hangers depending from the cross rail—and these hangers may be set to correspond with any length of flask up to 8 ft.—the pattern drawing plunger, which is square, is dropped with its four spuds mentioned upon the back of the pattern or follow board. As soon as it contacts with the pattern or follow board this cross rail with its spuds automatically sets up a pressure of about 700 lb. thereon. As the valve controlling the roll-over mechanism is now at lap, so that the flask is free to adjust itself axially on the trunnions, the contact of the first two spuds to

bear throws the joint of the mold square with the line of pattern draft, which is the line of the plunger. In order to complete the adjustment, the hanger opposite the one on which the roll-over cylinder and sprocket wheels are shown contains an adjusting screw driven by a 12-in. hand crank through miter pinions. This lengthens or shortens the adjustable hanger as the case requires, and brings the two other spuds in contact with the back of the pattern or follow board, thus squaring the mold joint with the pattern draft in this other direction. Simultaneously with the pressing down of the spuds to square the joint with the line of draft a pair of grab hooks at the end of the pattern drawing plunger, which have a vertical motion of 2 in. independent of the motion of the screw carrying spuds, seize a button headed plate in the back of the pattern or follow board, and, upon the starting of the pattern draft, draw the pattern from the sand while the four spuds still maintain the



Curtis-Mumford Overhead Molding Machine, with Patterns Drawn After Rolling.—The Apparatus Is Shown Hanging from the Main Crane Hook. When Regularly Used in This Way the Outside 14-In. Lifting Cylinder Is Not Required.

downward pressure which holds the pattern rigidly. This pressure remains constant during the pattern draft.

Before starting the pattern draft the flask is rigidly secured against rolling on its trunnions by clamping the same mechanism which is used to roll it. The pattern draft is absolutely clean and not affected by uneven bottom boards, insufficient bedding devices, &c. The apparatus may be used with a special cradle for handling large, split core boxes, which have been jolt rammed, and also for taking out and handling the flasks, if this is required of it. No change in patterns, follow boards or flasks of any sort is required, except the bolting to one end of each flask of an angle to be engaged by the dog which the roll-over mechanism drives. It will be seen that it is not essential to the operation of this apparatus that the patterns should be secured to the follow boards and drawn with them, which always involves a blind lift. It is one of the great advantages of the ap-

paratus that the follow board may be loose and removed from the pattern before it is drawn. This, as in the case of spur gears, gives an opportunity to watch corners which may stick and start with the pattern, and to nail such parts as will not draw without nailing.

Inasmuch as neither patterns nor follow boards are in any way secured to the machine, but are simply picked up by it, its application is not limited to a single set of patterns, but it may be used for a constantly changing variety in sizes of molds.

The Use of Steel Scrap in the Cupola.*

BY C. R. M'GAHEY, RICHMOND, VA.

The foundryman of to-day is confronted with the problem of what kind of cast iron he shall try to make; whether to go into irons that show greater elasticity and strength, or to stick to softness regardless of what the work is intended for. In working on this problem myself, I took for my standard for comparison a test bar longer than the ordinary, as this did not run the breaking strengths too high, and also gave deflections more readily observable than with the ordinary 1½-in. round bar broken on supports 12 in. apart. My tests ran from 750 lb. up to 2400, with a 1 x 1 x 24 in. bar, separately cast—not as a coupon. The deflections approximated from 0.10 in. up to 0.55 in. This range obtained with all kinds of iron in the ordinary run of shop work is not at all satisfactory, and it would seem that some point ought to be selected to which foundrymen should work in order to get the most satisfactory product in regular jobbing castings—not special work.

To best resist repeated strains, shock and heavy work, it is necessary to run the elastic limit up as high as possible and yet hold a good deflection. Since the breaking strength and elastic limit in cast iron are not far apart, we would naturally try to get our transverse test quite high, and for the bar in question aim at 2000 lb. and perhaps even higher, the deflection running up to 0.50 in.

It is further necessary to reduce the shrinkage to a minimum, so that the interior strains may be obviated as much as possible. This is particularly the case where pulleys, flywheels and the like are made. A careful study of the chemistry of iron will assist in this, and the addition of steel to the mixture, thus reducing the total carbon, gives us the best solution. In this way it is possible to run up the strength of the bar 70 per cent. and also greatly increase the deflection.

The terms semi steel and ferrociron, while used with good intentions, are entirely misleading, as we do not convert the iron charged to steel or anything like steel, but simply dissolve the steel scrap added in the iron mixture, making it of higher strength. It is cast iron just the same.

Much Depends on the Coke.

In using steel scrap much depends on the coke for the fuel. I have found that with mixtures of the same composition and make-up, with one coke I would get a high strength, and with another quite the reverse. The melting conditions were exactly the same, and the peculiar results are doubtless due to the composition, structure and behavior of the coke in the cupola, causing the iron to melt more or less fast and remain in contact with the fuel to a greater or less extent. Thus a coke with a low ash—or in other words, high fixed carbon—gave a very hot looking iron, but with a much lower transverse strength than another coke higher in ash, but with the same sulphur (0.54). The addition of more steel scrap to the better coke gave the strength more nearly equal to the other metal, showing evidently a greater absorption of carbon from the fuel with the better coke and hotter metal.

It is, therefore, necessary to understand the fuel and melting conditions well in order to obtain desired results. It is further necessary to run quite hot, and, when much sulphur is present, to carry high manganese, as this tends to flux off the sulphur as a manganese sulphide. A very interesting observation was made when an ac-

cident stopped operations for a short time. The test bars made from the metal right after starting up again ran very much better than the average of the run. It seems as if the stoppage gave the steel time to get very highly heated up, and hence it melted more readily, thus producing lower carbon cast iron, with consequent higher strength.

How to Get the Materials to Mix Well.

To get the materials of the charge to mix well is very desirable. I have had the best results when allowing the bed to burn for 2 hr.—having it heavy enough to allow this—then to use every mild blast (from 5 to 6 oz. only). This always gave me higher strengths than when I used an 8-oz. blast or higher. If time is given for the steel to melt and mix with the cast iron the total carbon will be lower than if the cast iron of the mixture flows by the steel fast and has no chance to unite. For this reason also it is better to place the chunky pieces of steel low down and the smaller pieces above. This allows the cast iron to wash it as it goes down and unite with the steel, making a low carbon cast iron with consequent strength.

The reduction of the total carbon by steel additions makes the resulting castings very much denser. If now the sulphur is controlled by hot melting and high enough manganese, and the phosphorus kept down (my best work has been with phosphorus about 0.230), very serviceable castings are made.

Another point that will be seen in this steel scrap addition melting is the rather great irregularity of the silicon reduction in hot runs and in the sulphur content. The latter will vary very much indeed. Silicon, on the other hand, usually runs about 0.25 per cent. loss in normal heats, but is much greater if the temperature gets up fast. The deflection is better when the sulphur is down.

Results of Tests.

The following are some results that may be of interest: Metal which would have about ¾ in. chill and be entirely gray when cast in sand, in the 1-in. square section had silicon 0.82, sulphur 0.097, phosphorus 0.23 and manganese 0.54. This metal in a bar 1 x 1 x 24 in. broke at 1800 lb. with a deflection of 0.38 in. The percentage of steel carried was 7. The coke used contained sulphur 0.54, phosphorus 0.63, fixed carbon 92.53 per cent. Another test gave silicon 0.88, sulphur 0.081, phosphorus 0.24, manganese 0.67. The test bar broke at 2200 lb. with 0.40 in. deflection, and the charge contained 20 per cent steel. A third test gave silicon 0.58, sulphur 0.097, phosphorus 0.25, manganese 0.44, and the bar broke at 2250 lb. with 0.48 in. deflection, and had 23 per cent. steel scrap (structural shapes). Another good mixture gave silicon 0.79, sulphur 0.081, phosphorus 0.239 and manganese 0.64. This carried 21½ per cent. steel scrap.

I find that, to get the strongest bars, I have to keep pretty close to these analyses, and have made my strongest bar at 2350 lb., with 0.55 in. deflection. The iron had a fine grain, was low in graphite, but machined nicely. When ferromanganese was used about 1 per cent. was found to be best. The above resulting compositions (the silicons of the mixtures being calculated to bring them about) are intended for castings ranging from 1 to 2½ in. in section. Should heavier work be required it is better to run the silicon in the pig up to 2.75 and the manganese up to 2 and to use 33 1-3 per cent. steel scrap.

The Detroit Iron & Steel Company, Detroit, Mich., has awarded the contract for two blowing engines for its new blast furnace to the Allis-Chalmers Company. The same company was given the contract for one 250-kw. engine, direct current generator and two 8-in. double suction centrifugal pumps, each pump connected with a 125-hp. noncondensing steam turbine.

The Riter-Conley Mfg. Company, Pittsburgh, has received a contract from the Thomas Steel Company, Niles, Ohio, for a steel building, 150 x 250 ft., to contain five hot sheet mills and three cold mills, which are to be furnished by the United Engineering & Foundry Company, Farmers' Bank Building, Pittsburgh.

* Read before the American Foundrymen's Association, Cincinnati, May, 1909.

A German Electric Car Dumper.

BY DR. ALFRED GRADENWITZ, BERLIN.

The car dumping equipment recently constructed by the Benrather Maschinenfabrik, Düsseldorf, for a German mine, is the first German plant in which a single platform is used both in lifting and tilting. It is designed to transfer ore and blast furnace materials on their arrival in ordinary open gondola type cars into self-tilting Talbot cars, and mainly comprises two parts, the platform for raising the full car and tilting it and a hopper of 120 tons capacity into which the car load is discharged. The materials are thence discharged through a movable chute into the self-tilting cars. The chute and its gate valve are operated by a common electric winch.

Four wire ropes support the platform, which is 34 2-3 ft. long and 77½ ft. wide and lead over pulleys to the four drums on which they are wound. The drums are operated in pairs by a 45-hp. motor at each end of the platform and give a lifting speed of 18 ft. per minute. The two driving gears are connected together by a friction clutch, while the platform is lifted to a height of 36 2-3 ft., mounted on the worm shaft.

To avoid loss of time in arranging and shifting the cars to be discharged, the tilting device has its longitudinal axis coincident with that of the railroad track interrupted by the platform. The loaded cars are received on one side of the plant, and after being discharged leave from the other side of the hopper.

The platform, in its lowest position, rests on the foundation with its sliding doors opened by felt buffers, and the track locks fitting the feeding tracks to the platform turned down. The filled car then is pulled on the platform by capstans and its speed is checked whenever required by a rail brake actuated through a device on the platform, which acts on the wheel rims. As the car comes to position it erects two substantial clamps embracing the fore axle. The operator who is located in a cabin above the hopper then starts the driving gear by means of a controller handle and two automatic reversing starters. Lifting the platform causes a track lock to prevent the car from recoiling to be erected behind



The German Car Dumper in Tilted Position.

the last axle of the car, while the feeding tracks at the same moment are locked and the pit doors closed. After a lift of 35 2-3 ft. the current is cut out automatically and a pedal which had so far been bolted is disengaged. By pressing this pedal the operator then causes a support consisting of two props at the back end and two bearings for the tilting pivots at the fore end of the platform to advance, thus opening two rotary framework doors which prevent any access from the operator's cabin to the pit.

The platform then is lowered down on the support, and the driving gear stopped automatically, after which the operator proceeds to the cabin and there disengages the locking bolts of the front wall of the car which is designed as a trap. By thus lowering the platform a hand lever at the operator's stand has been disengaged, by means of which one of the motors is thrown out of circuit and the clutch connecting the two motors is disengaged. If now the reversing starters be actuated only the motor lifting the back part of the platform will receive current, while the platform with the car turns on two circular guiding rails round the tilting pivots until it is at an angle of 45 degrees with the horizontal. During the tilting operation the platform swings above the rope winches, after the safety device for preventing the ropes from leaving the winches has been removed. The current is thrown out automatically with an inclination of less than 45 degrees.

As soon as the platform has been set tilting the hand lever actuating the clutch and controller are again locked, so that they cannot be released until the platform, after discharging the car, has been returned to a horizontal position back on the support. On returning to this horizontal position, the rope guard is again turned round by the platform and the current is cut out automatically. The second motor now can again be put in circuit and connected by the clutch with the other motor.

The operator next raises the platform to its uppermost horizontal position, thus causing the framework doors to close, the props to withdraw and the actuating levers to be bolted, while the current is cut out automatically at the end. The platform being now lowered, the sliding doors are opened and the controller lever automatically restored to its central position. As the platform arrives at its lowest position, the clamps carrying the car and the three track locks are turned down, when the car can be taken out beneath the hopper. On

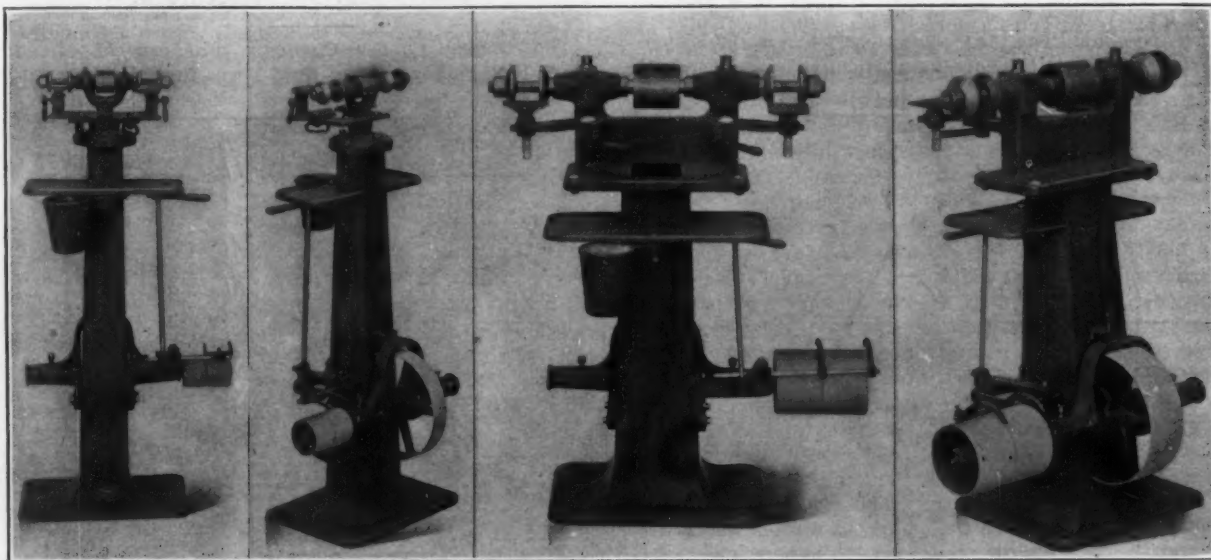


An Electric Car Dumper Built by the Benrather Maschinenfabrik, Düsseldorf, Germany.

leaving the platform the car also disengages the clamps so as to allow all the axles of the empty car to pass over the platform, and the first axle of the next filled car is again seized by the clamps.

Any possibility of accidents due to inadvertency of the operator is precluded, the current being interrupted automatically after each motion of the platform, both in lift-

column is furnished either with or without self-contained countershaft. The self-contained countershaft shown in the engravings is the most noteworthy feature of the machine. As can be seen, the lower half of each box for this countershaft is cast integrally with the bracket, the length of which is equal to the width of the column. This bracket is attached with a pivot screw toward the



Size No. 1.

Size No. 5.

The Smallest and the Largest of the Five New Grinders Built by the St. Louis Machine Tool Company.

ing, tilting and lowering, the operator being enabled only to start the motion corresponding to each operation by closing the circuit. A six-fold starting and six-fold automatic disconnecting is thus required for tilting each car.

New St. Louis Grinders.

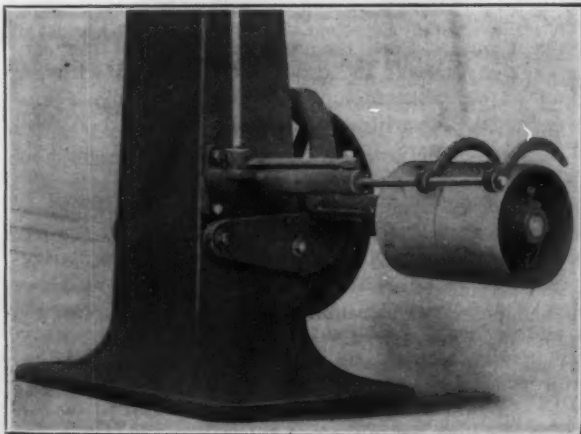
Heads of improved design have been applied to the new line of grinding machines manufactured by the St. Louis Machine Tool Company, St. Louis, Mo. The bases of the machines are very long, extending out beneath the bearings, which contributes to rigidity. The arbors are of larger diameter than usual for the work listed, and are of 50 per cent. carbon steel, with square threads two pitch coarser than standard, making a strong and quick acting thread. The boxes are lined with high grade antifricition metal, and are provided with oil cellars and felt ollers, and in length are four times the diameter of the arbor. The rest arms are curved, permitting of a shorter fork than where straight rest arms are used, which is of considerable advantage when large work is to be ground.

The column shown is of new design, being large and well proportioned for the machine it supports. The pan is placed 4 in. below the base of the machine and gives more room than usual. The front of the column is at right angles with the base, all the batter being at the back, setting the head as far forward as possible. The

front of the column and with a screw toward the rear of the column, where the bracket is slotted to permit adjustment. The top halves of the two boxes are cast in one piece, connected by a strong and substantial loop which passes over the driving pulley and beneath a projecting lug on the column. This lug is provided with an adjusting screw which acts as a belt tightener. By loosening the two screws in the lugs at the rear of the column and screwing down on the adjusting screw, both the drive belt and the belt from the line shaft are tightened simultaneously. The boxes are long and carry the tight and loose pulleys out beyond the base of the column.

This type of countershaft affords several advantages over a countershaft on the ceiling, where it is convenient to place the machine beneath the line shaft. One of the most apparent is the avoidance of the necessity of attaching a countershaft to the ceiling. Another is that the drive belt is out of the way, which is often a great convenience when it is necessary to handle large work; but the most important is the very smooth running of the wheels—the belt strain being down against the body of the machine gives the wheels a smooth running motion which it is impossible to get with this class of machine when belted up.

There have been numerous attempts to furnish a satisfactory self-contained countershaft, but so far as the company is aware this has not been accomplished prior to the advent of the machine here shown, as with the short belt on this class of machine without proper belt tightening device there was great difficulty in keeping the belt at the proper tension. The popular prejudice against short belts the builder declares to be a misconception growing out of the fact that ordinarily there is no means of taking up the stretch except by cutting the belt. The only reason why a long belt operates longer without cutting than a short one is that the elasticity of the belt permits it to be put on the pulleys at a higher tension than it is practical to put on a short belt, and that when it stretches the weight of the belt itself furnishes sufficient traction to the pulleys to cause it to operate with a passing degree of satisfaction for a longer time than a short belt will operate. Where the centers over which a short belt operates can be gradually spread so as to keep the proper tension on the belt, thus securing at all times an even and maximum traction, a short belt is more effective than a long one not provided with means for spreading the centers.



Detail of the Base, Showing the Adjustable Countershaft.

The New Meriden Turret Lathe.

Several interesting mechanical features are to be found in the new turret lathe, Fig. 1, built by the Meriden Machine Tool Company, Meriden, Conn. It is a 20-in. friction head back geared machine, with power feed for turret and independent tool stops. The striking mechanical features may be seen in Fig. 2, which shows turret base and slide. The taper shoes inserted into the bottom part of the turret base are for vertical adjustment, while

turret stud, which adds greatly to rigidity. The hole through the spindle is 2 in. in diameter, and the six holes in the turret are $2\frac{1}{4}$ in. The spindle bearings are ground and Government bronze boxes are used. The front bearing is $3\frac{1}{8}$ in. and the back bearing $2\frac{7}{8}$ in. in diameter. The weight of the machine is 2240 lb.

Monel Metal Manufacturers.

The Orford Copper Company, producer of Monel metal, 43 Exchange place, New York, furnishes the fol-

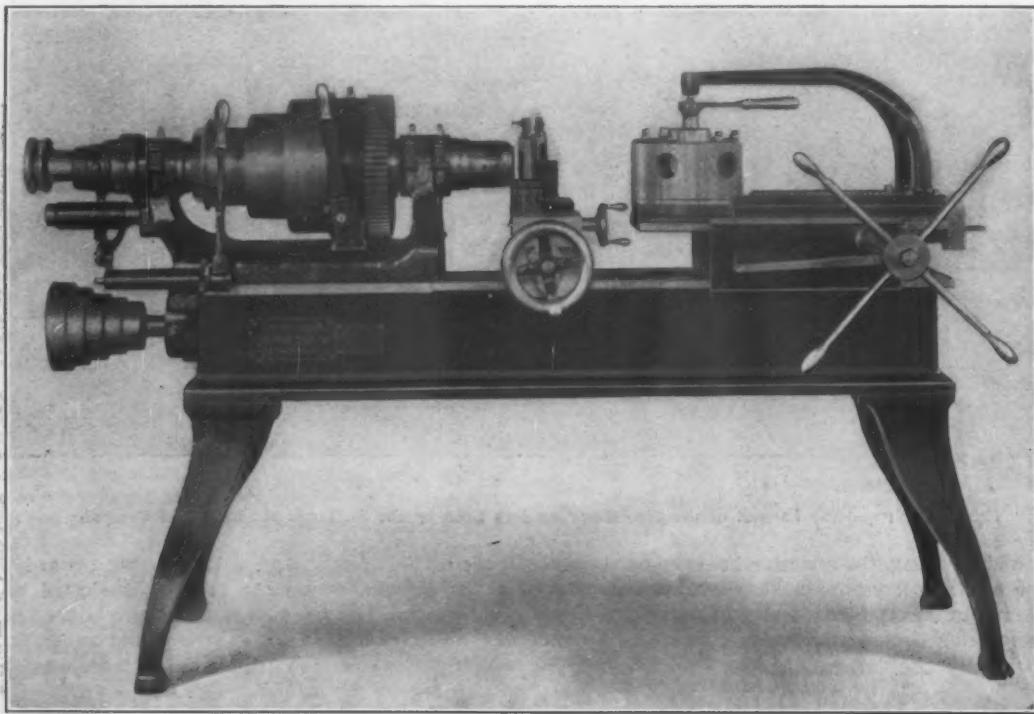


Fig. 1.—The New Turret Lathe Built by the Meriden Machine Tool Company, Meriden, Conn.

on each side of the slide are taper gibs for the lateral adjustment. As a result the turret may be always kept in perfect alignment. The base is adjusted longitudinally and is held in place by straps to the under side of the top of the bed. Convenient features are the two levers shown at the front of the head, one operating the power feed, the other the automatic chuck. There are five changes of power feed, which may be thrown in or out at any point of the cut, and thrown out automatically by stops at the

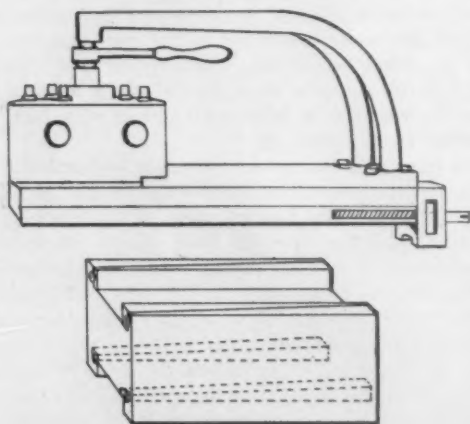


Fig. 2.—Sketch of Turret Base and Slide.

end of cut. The cut-off slide is operated by a handwheel and left hand screw. The front tool post has a longitudinal movement by the use of a cross feed screw and removable handwheel.

The increase in the height of the turret, resulting from the use of self-opening dies and large box tools, necessitating a greater swing over the turret slide, results in an additional strain, which has been provided for by a fork brace from the back of the turret slide to the top of the

following list of those who are prepared to furnish the metal in manufactured form:

Drawn, spun and stamped sheets, Geuder, Paeschke & Frey Company, Milwaukee, Wis.

Hot rolled sheets, American Sheet & Tin Plate Company, Pittsburgh, Pa.

Cold rolled sheets, Orford Copper Company, 43 Exchange place, New York.

Rods and bars, I. G. Johnson & Co., Spuyten Duyvil, New York; D. G. Gautier & Co., Hudson Terminal, New York; Coe Brass Mfg. Company, Ansonia, Conn.

Castings, I. G. Johnson & Co., Spuyten Duyvil, New York; Oakley Steel Castings Company, Millbury, Mass.; Nelson Valve Company, Ivy Hill, Pa.

Bolts and nuts, Russell, Burdsall & Ward Bolt & Nut Company, Port Chester, N. Y.

Valves, Nelson Valve Company, Ivy Hill, Pa.; Pratt & Cady Company, Hartford, Conn.

Nails, American Steel & Wire Company, Worcester, Mass.; U. T. Hungerford Brass & Copper Company, New York.

Wire, Driver-Harris Wire Company, Harrison, N. J.; American Steel & Wire Company, Worcester, Mass.

The Cambria Steel Company has awarded the contract for a reservoir to be used in connection with the works of the Manufacturers' Water Company, Johnstown, Pa. A dam will be built and a pipe line laid from Jerome Junction to Johnstown, a distance of about 18 miles, and it will require probably two years to complete the reservoir. In this manner it is proposed to guard against a water shortage in dry seasons.

The manufacturers of Newark, N. J., held a meeting and banquet on the evening of May 24, to discuss the benefits of a metal trades association labor bureau and to consider the advisability of closer affiliation, and also to talk over industrial education. Commissioner Wuest of the National Metal Trades Association was in attendance.

An Airtight Annealing Box.

An airtight or liquid sealed annealing box has been devised by W. R. Kinnear, which embodies many desirable features, and on which United States and foreign patents are pending. This box may be utilized for annealing sheets, plates or tool steel, or for case hardening or any other process requiring the exclusion of air circulation during the cooling operation.

The lid of the box used for annealing sheets or plates, as illustrated in Fig. 1, is like those available in general

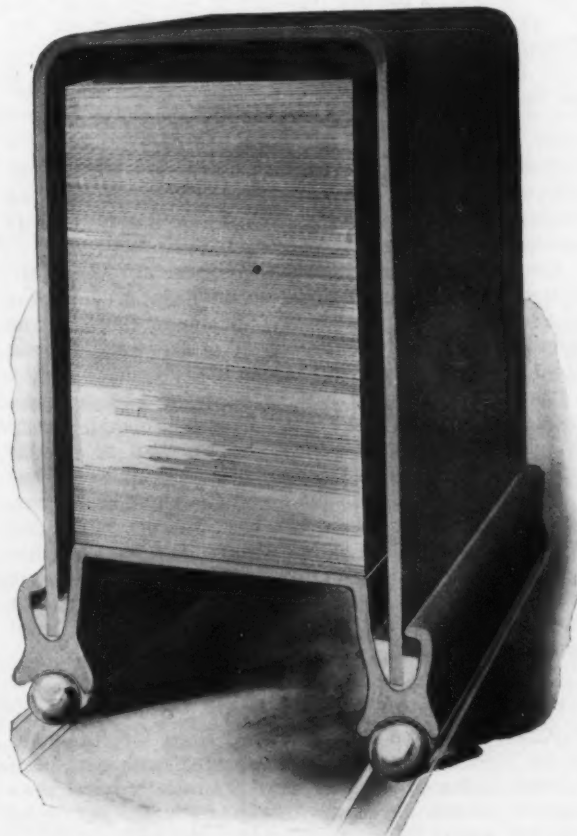


Fig. 1.—Airtight Box for Annealing Sheets or Plates.

practice, while the stand or base comprises an elevated center or platform surrounded by a V shaped groove or channel. The bottom edge of the lid rests in this groove, in which is placed a given amount of lead. The lead melts under low temperature, thus forming a complete liquid seal between the lid and the stand, not only during the heating operation but when the box and its contents



Fig. 2.—Sealed Box for Annealing Tool Steel.

are slowly cooling as well. When cold the lid is readily withdrawn from the cold lead. This liquid lead seal permits the outward passage of gas generated on the interior of the box, but will not allow the passage of air from the outside to the inside. A partial vacuum created in the box lifts the melted lead level on the inside to a higher point than the outside level, as shown in the illustration. This variation in levels in no way interferes with the tightness of the joint, but, on the contrary, serves to emphasize its tightness.

The lead remains in the groove of the stand and is

thus always ready for subsequent heats. To prevent loss of lead, due to its frequent exposure to intense heat, a small amount of graphite is utilized in conjunction with it. The graphite floats on top of the melted lead, absolutely preventing its oxidization. Elevating the center of the stand considerably above the outside groove provides for drainage of the sheets or plates, which are usually quite wet from the pickling operation.

Under regular commercial conditions it has been tested for sheets, carrying at each heat about 6 tons. The sheets were not only perfectly annealed, but also came out in a most decided silver gray color, practically eliminating the usual blue color of annealed sheets. The only blue color noticeable was one-eighth to one-quarter of an inch border at the edge of the sheets. The sheets were so clean and free from scale that they were successfully galvanized without a further pickling operation. In each case the annealing was so apparently perfect that the loss in wastes was a very small fraction of 1 per cent.

A much smaller box, Fig. 2, was fully tested at the works of the E. W. Bliss Company, Brooklyn, N. Y., with relation to the annealing of tool steel, and the work it performed not only met with the entire approval of the engineers in charge, but the results were considered far superior to those accomplished by older methods. Raymond H. Kinnear, 2 Rector street, New York City, is in charge of arrangements for supplying the trade.

Customs Decisions.

Planished Copper Plates.

The United States Circuit Court at New York has reversed the Board of General Appraisers in the case of B. F. Drakenfeld & Co. regarding the classification of planished copper plates. The court holds that the collector at New York, as well as the board, erred in classifying the plates under the tariff provision for "manufactures of metal not specially provided for," with duty at the rate of 45 per cent. The importers claimed, primarily, that the merchandise is entitled to free entry as being copper in plates not manufactured. The other claims advanced by the importers allege duty either under paragraph 166 or else under paragraph 176. The court upholds the latter contention, deciding that the articles fall within paragraph 176, which provides for "copper in rolled plates, called braziers' copper, sheets, &c.," 2½ cents per pound. The decision says:

The article in question, if it had been engraved, would undoubtedly be classifiable under paragraph 166. Copper in rolled sheets or plates would seem to have been provided for by Congress in paragraph 176. If the collector and the Board of General Appraisers were right in their reasoning they would seem to be charging Congress with the intention of classifying this article at a 45 per cent. rate before it is engraved and at a 25 per cent. rate after engraving. If the courts accepted such an interpretation the importer would be apt to have his plates engraved on the other side of the water, to the detriment of the American engraver as well as the finisher.

Steel Window Sashes.

The United States Circuit Court has declined to grant lower duty on complete steel window sashes imported by Edward M. Ackerson, New York. The sashes are fitted with steel sides, have gun metal stays and gun metal handles or hinges, all fastened together. The Government alleged that the sashes are to be classified as "manufactures of metal," under paragraph 193, and therefore dutiable at the rate of 45 per cent. On the other hand, the importer sets up the contention that the merchandise falls under the provision in the law for "shapes of iron or steel, punched and ready for use." According to this contention, the articles would pay a duty of five-tenths of 1 cent per pound. In affirming the decision of the Board of Appraisers and overruling the importer, Judge Platt says in part:

I think the merchandise imported, without the attachments, has been too far advanced in manufacture to permit its inclusion within the provision of paragraph 125. The steel parts out of which the sashes have been manufactured might very well come within the description "shapes of iron or steel, punched and fitted for use," but after they have been assembled and united into the complete window sashes which we have before us, I think they should be treated as "manufactured."

Foundrymen's Fourteenth Annual Convention.

A Record Attendance at the Cincinnati Meeting of the Four Allied Associations.

For four years in succession the conventions of the American Foundrymen's Association have been great outpourings of foundry superintendents, foremen, proprietors and the smaller but vastly important army of men who sell machinery, supplies, pig iron and metals for use in the foundry. The convention at Cincinnati last week was probably in most respects the greatest of the four great ones. The attendance was beyond 2000, the registration showing that about 1800 received an official badge as guest or member. The meetings for papers and discussions had better than the average attendance, and more interest was taken in the discussions than is usual. The exhibit of foundry equipment and supplies was probably more comprehensive than any that preceded, though that at Toronto had the advantage of all the facilities that go with the grounds of a long established industrial exposition.

All these gatherings impose an amount of labor on a few on whom the burden of preparation and entertainment is laid that can only be appreciated by those who have gone through a like experience. As organizations have multiplied in connection with the foundry movement, convention machinery has become more complicated and decisions are not so easily made and carried out as in the earlier years. The commercial and educational features naturally come into competition occasionally, but the spirit of give and take solves most of these difficulties, so that the general result is an improvement each year on what has preceded.

Joint sessions of the American Foundrymen's Association and the American Brass Founders' Association were held this year. This was better than the Toronto arrangement of separate meetings, but next year it is probable that both joint and separate sessions will be held. The second floor of Music Hall was not an ideal place, in view of the energetic, even if not continuous, operation of molding machines on the main floor, but experience has shown that it is not well to have the meeting room and the exhibition too far apart. In presenting some account of the technical sessions below we have separated the iron and the brass sections.

IRON AND STEEL FOUNDRY PRACTICE.

The proceedings of the opening session of the American Foundrymen's Association and the American Brass Founders' Association were covered in *The Iron Age* of May 20. The single paper presented at this session was the report of the Committee on Prevention of Accidents in Foundries, read by the chairman, Thomas D. West. The following suggestions for the prevention of accidents were made by the committee:

1. Weekly or monthly inspection of all chains, slings, hooks and ladle bows, &c., by competent persons, reporting to the office. A yearly or semiannual annealing of chains.
2. Clean tools and an orderly arrangement of all shop appliances. Compelling all employees to keep everything in its proper place when not in use.
3. Well lighted shops, especially on dark days, and at night having lights powerful enough to penetrate steam and dust and yet give no sharp shadows on the floors.
4. The use wherever practicable of tramways to carry molten metal from the cupola to the floors. When this is not possible, loose earth should be provided about the cupola spout, side-tapping being preferable. (This because the greatest number of accidents by burns are said to occur there.)
5. Requiring carriers of molten metal to wear the proper kind of shoes to safeguard their feet. Providing goggles for the grinders to protect their eyes.
6. Prompt action in cases of gross carelessness, disobedience and taking chances by employees.

In the discussion of the paper a member suggested that it would be interesting to find out what proportion of foundry accidents are contributed by foundries in "dry" towns and what proportion in "wet" towns, the speaker being of the opinion that liquor is the cause of many accidents in foundries. It was stated, however,

that in the committee's statistics this was not often assigned by those reporting as a cause of accident.

Industrial Education.

P. Kreuzpointner, Altoona, Pa., chairman of the Committee on Industrial Education, presented an interesting report reviewing the developments of the year in the line of the committee's work. At the suggestion of Mr. Kreuzpointner, a resolution was passed commending the work being done by the public schools of Cincinnati in the furtherance of industrial training.

The Converter in Steel Foundries.

The paper of J. S. Whitehouse, Bonney-Floyd Company, Columbus, on "The Side Blow Converter for Steel Castings" was an interesting feature of the Wednesday morning session. It is given elsewhere in this issue.

Questioned as to the reason for using scrap, Mr. Whitehouse said this was to keep the metal from getting too hot, as very hot steel causes burning of the sand and makes the castings hard to clean. The question was raised whether there would not be difficulty in pouring a full heat from the bull ladle when using 1.25 per cent. silicon iron in the charge. Mr. Whitehouse said that in his practice at Everett, Mass., he had had no trouble with such iron, and had poured heats running not over 1 per cent. in silicon. In his present practice he is pouring full heats for castings under 30 lb. from a batch of 1000 lb. of steel in the ladle. Mr. Whitehouse said that he had discarded upper tuyeres altogether. He was thanked by several speakers for giving information not generally available concerning converter practice in steel foundries.

The Small Open Hearth Furnace.

In the absence of W. M. Carr, the author, Secretary Moldenke, presented the paper on "Open Hearth Methods for Steel Castings." It was devoted mainly to a description of the small open hearth furnace Mr. Carr has designed, details of which were given in his article in *The Iron Age* of February 11, 1909, page 466.

A number of questions were asked, showing considerable interest in the possibilities of an open hearth furnace making heats of from 500 lb. to 2 tons. In Mr. Carr's absence a question as to the approximate cost of a 1000-lb. open hearth furnace went unanswered. Dr. Moldenke said he had attended the recent convention of the American Electrochemical Society at Niagara Falls to learn what the foundry may expect from electrical furnace developments. Plants located in out of the way districts where water power is available do not meet the case, he said. What the founder wants is a practical means of producing steel castings cheaply in a plant auxiliary to the iron foundry. The speaker considered the electrical production of steel as now developed too expensive for the foundry. If nine-tenths of the work in the manufacture of steel castings could be done cheaply, it might be possible to use electricity for the remaining one-tenth, as it makes fine steel.

T. J. Best asked as to the possibilities of manufacturing small castings of steel, and it was replied that at one plant steel castings 20 to the pound were being made, though this was in conjunction with heavier work which could be poured from colder metal.

The papers of W. H. Kane on "Air Furnace Construction for Malleable Castings" and of Richard K. Meade on "The Use of Pulverized Coal for Foundry Purposes," were presented in brief abstract. To the question whether pulverized coal has been used in the cupola, Dr. Moldenke replied in the negative, but added that in Germany oil has been used in the cupola. His own experience had been that unless the air was preheated there would be trouble with the use of the oil jet. He had witnessed some experiments in a Chicago foundry, where it took 1 hr. to melt 1000 lb. of iron with oil, whereas $\frac{1}{2}$ hr. was long enough. The result was

oxidation of the metal. He considered the pre-heating of air in Cowper stoves to a temperature of 1000 degrees as a necessary preliminary to the use of oil.

The paper of George Muntz on "Machine Molding versus Hand Molding" was read by title.

Cost of Steel Castings.

Bradley Stoughton, New York, presented a paper on "The Cost of Steel Making in Foundries," showing by lantern slides the tables given in his paper as printed elsewhere in this issue. Answering the question whether the electric furnace could be used for the refining of iron after melting in the cupola, Mr. Stoughton said this could doubtless be done in a large electric furnace, and the cost would be less than if metal were taken from the converter and then refined electrically, but not very much less. S. S. Knight, Chester Steel Casting Company, Chester, Pa., asked whether the allowance for operating costs in Mr. Stoughton's tables included overhead charges and expense of selling. It was replied that this item as given includes repairs, depreciation and interest on investment, but not office expense, insurance or selling cost.

Continuous Melting.

After a paper by D. S. Hawkins on "The Heart of the Foundry," which treated on already familiar lines of the construction and management of the cupola, one of the most interesting discussions of the session was brought out by the paper of S. D. Sleeth on "Continuous Melting in the Foundry of the Westinghouse Air Brake Company." The mold conveying plant at Wilmerding, Pa., and the other installations connected with the system of continuous molding, pouring and shaking out of castings, which have been for a number of years in use at the Westinghouse foundry, are familiar to all foundrymen who have visited Pittsburgh. Mr. Sleeth summarized the experience with this plant as follows:

When the Westinghouse Air Brake Company found it necessary to enlarge its plant, on account of increased business, it was decided to move to Wilmerding, Pa., and install in the foundry flask and sand conveyors. This meant that the foundry would have to run so that iron could be poured all day, instead of 2 or 3 hr. in the afternoon. We knew of no plant where this was being done, so it was up to our foundry to work it out. As it required about 2½ hr. to run the heat off at that time, we decided to see how much longer we could hold the metal in the cupola and still keep it hot. The first day we put the blast on ½ hr. earlier and melted the iron with the same blast pressure, but would shut the blast off for 5 or 10 min. and then start to blow again. This we found to work satisfactorily for that day. The second day we put the blast on 1 hr. earlier, but this did not work so well; we therefore added more coke, which kept the metal hot, but the melting was slower.

When we started work in the new foundry at Wilmerding we ran two cupolas, one in the morning and one in the afternoon. We were afraid to hold over dinner hour. After running for some time in this way, we decided to run one cupola all day; at 11 o'clock, or a little later, we added 200 lb. of coke for two or three charges so that we would have an extra amount of coke to hold over the dinner hour. Our great trouble at this time was with the cupola man, as he insisted that the iron would freeze at the tapping hole, but we finally persuaded him that he would not be held responsible should this occur. We drained all the iron out at 12 o'clock and closing the slag hole with sand, stopping the tapping hole, and shutting all other openings tight, so there would be no draught. About 10 min. before starting time we tapped out all that was in the cupola and pigged it, then put the blast on full, so as to be ready when the starting whistle blew. Sometimes we have to pig 200 or 300 lb. on account of the metal not being hot enough.

We had two sizes of cupola—48 in. and 60 in. inside the lining. When the heats were heavy we would run the 60 in. We had to enlarge the plant again so we took out the 48 in. cupola and installed two new cupolas, the shells being 90 in., so that we could line them up to 78 in. if required. We have them lined at the present time to 70 in. When running full, i. e., night and day, we melt 280 tons, running each cupola about 10 hr. We have operated one cupola from Friday night at 6 o'clock until Saturday noon of the following day, closing down at 11 p.m. for ½ hr. for lunch, and again at 6.30 in the morning for ¾ hr. for breakfast. This is rather hard on the lining so we do not make a practice of it.

We have tried a great many experiments with cupolas, but as yet have been unable to find any that will give better results than the double row of tuyeres—the upper row about 10 in. above the lower. It is not necessary to keep

the upper ones open all the time. Our blast pressure is about 11 ounces in the cupola bustle. We use a far for blast. When running full we melt 10 to 11 lb. of iron to 1 lb. of coke.

In charging the cupola we are very careful to have the charge level. We charge the pig by hand and the scrap is dumped in from a buggy through a door above the regular charging door. All the charges are the same from beginning to the end of the heat. As the iron must come very soft and uniform we do not charge more than 4000 lb. at one time. For a smaller cupola the charge would naturally be less.

To sum up our experiences, I would advise: See that the coke bed is burning even all around, then charge just as you would for an ordinary run, allowing an extra amount of coke for the dinner hour. After running about 1 hr., open the slag hole and keep it open, except during the dinner hour. Use about 40 to 50 lb. of limestone to 1 ton of molten metal—better to use too much than too little. Have the cupola shell large enough, as it is easy to put in an extra lining for smaller heats.

P. H. Mueller, Mueller Mfg. Company, Decatur, Ill., said that his company had been figuring on a belt conveying device. One such system which they had installed at large expense lasted only a few weeks. The chief troubles were that the bearings were cut out and the sand halled up.

Mr. Sleeth was subjected to a steady fire of questioning which brought out more details of the system followed at Wilmerding. The mold conveying table travels at the rate of 21 ft. a minute, which allows time for the setting of cores by workers who walk alongside the moving table. The pourers get on the platform with their ladles and move with it. Small castings are poured on this table and the melt of iron is 52 tons a day. The question came up as to what amount of work should be put through the foundry in a day to make continuous molding and pouring economical. Mr. Sleeth's idea was that 40 to 50 tons would be required. The economies of the system, he explained, consist in getting back the sand in 20 min. after the castings are taken out, in getting back the flasks promptly and in the repeated use of sand and flasks on the same conveyor. Questions were asked as to molding machines used and as to the management of the cupola. In the latter upper tuyeres are used only part of the time, and the speaker could not recall when they had been used continuously through a heat. It was found that the bottom dropped about as well after a long stretch of melting as though there had been but three or four hours of it. In the operation of the conveying table it was said that the displacement of sand in the mold due to the motion gave very little trouble. The brass founders present were interested in knowing whether the system could be applied to their work. Mr. Sleeth said that it was not used in the brass foundry at Wilmerding, though so far as the conveying system goes he thought it could be applied to brass as well as iron, and that continuous pouring would work also in the brass foundry. He doubted the feasibility of using continuous melting in a foundry turning out different classes of castings in the same day, as continuous melting gave but one kind of iron.

A question was asked as to the amount of iron that could be secured from the cupola under continuous melting. Mr. Best said that from his experience it was possible to get 60 tons a day from a 36-in. cupola. Mr. Sleeth referred to some trouble resulting from the freezing of the tap hole in the early experience at Wilmerding, but there is none of this now. The loss of metal he put at 3 to 4 per cent. Gates were counted in as waste, as it was found entirely out of the question to clean the gates from these small castings.

The following written contribution to the discussion of continuous melting is made by G. K. Hooper, 165 Broadway, New York:

I am very glad to be able to discuss the subject of continuous melting, as it is one in which I am deeply interested and one with which in my experience of the last 10 years in designing and building foundries, I have been intimately connected. My first piece of work, in fact, as an engineer, was the development of a very complete continuous foundry system, and I have since designed several others and been connected with other foundries containing systems more or less continuous. I am at present building for a well-known interest a very large malleable foundry embodying quite a complete system of mechanical handling, it

being impossible in this case, of course, to carry on continuous pouring, although the melting proper goes on practically all day.

THE QUESTION OF TONNAGE.

Out of this experience I am enabled to enlarge somewhat upon the answers to questions asked Mr. Sleeth. For instance, one was on how small a tonnage can continuous melting be made to pay? He answered that this depends upon the work in any particular foundry. I would enlarge by saying that the tonnage has less influence on the economies to be gained by operating continuously than the number of molds to be handled, as it is at once apparent that a few molds may contain a large tonnage to which continuous methods would be entirely unsuited, while a less tonnage frequently is distributed in a very large number of flasks, the handling of which, with the sand, castings, cores, &c., would undoubtedly yield large economies if carried on mechanically and continuously. The mold, therefore, is the unit which must be used when considering whether the continuous method can be applied to any particular production, but it is not necessary to feel that if many sizes of molds are used, the system is inapplicable, since, as the sand is handled mechanically, it may be of considerable saving to standardize flasks to a few sizes and adapt the patterns to these standardized flasks, thus enabling a larger range of work to be handled with a minimum of difference in equipment in flasks, machines, &c.

Again, Mr. Sleeth was asked if the hot sand has any effect in causing loss of castings. His answer very truly was that generally it has no such effect if the pattern plate be suitably warmed, and he spoke of a 20-min. period as the time in which his sand is in circuit. I may say that by means of large cooling and mixing riddles it is possible considerably to shorten this time and consequently the amount of sand handled, and I am familiar with systems where the sand is actually in use again in a much shorter time than this. The first system with which I had to do had the sand in transit less than 3 min. from the time when it was dumped out hot, riddled, cooled, tempered, mixed and again deposited in the hoppers over the machines for reuse, going again into the mold undoubtedly within another 3 min.

Since the proof of the pudding lies in the eating, I am able to say that the foundry loss in this system was much less than when the molds were made on the floor, and it is, I find, the general experience of all who have these continuous systems that they operate with less foundry loss than on the same work when made on the floor, even though a lower rate is paid for labor in operating such system than is customarily paid in floor work.

METHODS OF HANDLING SAND.

It is proper at this point to speak of methods of handling molding sand by means of conveyors, and I will say of this that in my experience belts are the most suitable for this purpose. Canvas belts can be efficiently used where the sand is dry, as in shaking out or dumping conveyors, but with tempered sand a rubber belt is preferable, as the sand will more freely discharge from it and the moisture of the sand will have less effect on the belt surface. Flat belts are superior to troughed belts for this service and wide belts moving slowly than narrow fast running belts.

A drag or scraper conveyor may be used in distributing sand to hoppers over molding machines, and is, in fact, the best device for this service, and it also should be large and slow moving, both to avoid wear and to preserve the condition of the sand, since the tempered molding sand has a tendency to "ball," and once in that condition must be crushed or dried to again render it suitable for use. The drag conveyor is preferably made with a wooden trough and wood conveyor flights. Netting on riddles and sieves is preferably made of phosphor bronze wire, and top bolts and nuts on apparatus requiring renewals should also be of bronze.

A type of "continuous foundry" has attracted considerable attention the past few years in which the molding and pouring is done on one floor, the shaken out sand falling through gratings into a basement, where it is suitably prepared and sent again by elevators to the floor above for reuse. I have failed to discover any advantage in a foundry constructed in this way and it possesses, in fact, the very serious disadvantages of high cost of installation and operation, since a two-story building costs at least three times as much as a one-story building—probably the difference is greater than this where a floor is filled with gratings and supports for machinery—a large expense is involved in duplication of equipment for screening and retempering sand, and more labor than is necessary is employed in this latter work.

It is entirely possible to handle all of the sand required by productions up to 100 tons of castings per day and over with two men, although as much as 100 tons of sand per hour may be passing through the systems. The users of a very successful system handling a large tonnage have informed me that they use no men at all on their sand handling system, but it is difficult for me to believe that it is not given some attention during the day. I believe, though, that two inexpensive men can handle the largest sand conveying system.

The two-story foundries are, in my opinion and experience, much more expensive to build and operate than modern practice makes necessary.

DAMAGE TO MOLDS.

Mr. Sleeth was further asked if any damage is noted to molds from the movement of the mold conveyor, to which he suitably responded that none is noticed. This would, in fact, be predicated by the fact that the foundry loss in these systems is generally less than in floor work; but I can go a step farther than this and say that molds may be subjected to what would be considered very rough treatment and yet suffer no damage, as I have repeatedly loosened up all connections on a mold conveyor and shaken the car conveying a mold with all my strength while it was being poured, banging the carriage against its supports hard enough to slop the iron out of the sprue and found no apparent defect by sufficient commercial test in the casting.

The casting made in these molds was a hollow casting of varying lengths, and thin section poured from one end, the core held by a print at one end only, resting upon wire chaplets bearing against tin spots in the core for the remainder of its length.

I am familiar with mold conveyors when the carriage is suspended from an overhead track, and allowed to swing free except at the point where the pouring is done and no trouble is experienced by damage to the molds. A gain is, in fact, made by building a mold conveyor in this way, as less power is required for driving it, less wear is entailed and the supporting frame work is cheapened.

I have learned of a continuous foundry in which the molds when made are carried to the cupola upon trucks provided with springs, poured and then carried on to a cooling and dumping point, and I am advised that the loss in this foundry is less than it was when the same molds were poured upon the floor by bringing the iron to them.

CUPOLA OPERATION.

The operation of the cupola was also touched upon. My experience goes to show that this is perhaps the most easily managed function of the whole system, since, if the blower—and I think the positive blast blower is best for the purpose—be driven by a direct connected engine with its valve easily accessible from the pouring platform, great variations in melting speed may be obtained with little detriment to the quality of the iron, and by thus handling the blower and having means of communicating at the same time with the charging floor, the cupola may be easily held for considerable periods, such as for changing patterns, &c., and operation started immediately when desired. I have spoken of stopping for changing patterns on purpose, as there is little need for extended stops on any other account, as a suitably designed system will operate on less than 2 per cent. loss of running time from accidents.

The cupola is preferably run with an eye to the production of castings rather than the saving of coke; but this, of course, settles itself, and a ratio develops itself which may easily be as high as the best cupola practice affords. Mr. Sleeth has said, in fact, that his is between 10 and 11 to 1. It is much better, though, to produce castings than try to save coke.

NOT AN EXPERIMENT.

I am a little surprised to find among foundrymen, otherwise so well informed, an impression that this continuous method is in an experimental stage. Nothing could be farther from the fact as the method is so aged that the "mother" patents upon it have expired, and the former owner of them tells me that his original system has been running for 18 years and is still in use. I had the privilege of building quite a complete plant some six years ago for his company, in which three systems were installed, one entirely continuous and two intermittent—that is, in one the molds are carried and in the others only the sand is handled by conveyors, the molds being poured on the floor from iron brought on overhead tracks, and these systems have been in continuous operation. His company is now building a foundry containing four continuous systems. My own experience with this method began 10 years ago with a system which was put into successful operation.

Mr. Sleeth's has been running for undoubtedly 15 years, perhaps longer. I have been familiar with it for about 12 years, and there are a sufficient number of others in successful and every day operation to put the scheme entirely out of the class of experiment. There have, of course, been some attempts which have been notable failures. Several systems having been devised and installed by builders of conveying machinery who have attempted to handle molding sand as they would other and very different materials and who have not had a sufficiently adequate comprehension of the comparative relations of the foundry operations involved. On the other hand, many capable foundrymen have designed systems which they have tried to make too automatic. I can recall one generally on the lines of Mr. Custer's design, but which failed through not having his permanent mold. He has put the continuous method very far forward, and is entitled to great credit for his success.

Elasticity is very essential in every function in the con-

tinuous method with the sand mold and plenty of "elbow room" where the different operations are brought together.

Permanent Molds.

The paper of Edgar A. Custer, president of the Tacony Iron Company, Tacony, Philadelphia, on "The Permanent Mold," was the feature of the Thursday morning session. Mr. Custer had intended to illustrate his paper by the use of moving pictures and preparations had been made for this at considerable expense, but the Cincinnati Board of Underwriters refused to grant the needed permit. Lantern slides were used, however, to good effect and the paper, which was given entire with illustrations in *The Iron Age* of May 20, proved to be one of the most interesting and valuable that has ever been presented before the association.

In answering the questions put in the discussion Mr. Custer was compelled to traverse some of the ground covered in the paper. Of particular interest were the inquiries as to the number of castings that could be made from a single mold and as to the interval between one use of the mold and the next. From a mold shown on the screen it was stated that 4000 lengths of soil pipe had been made in seven months with the mold apparently as good as at the beginning, except for a few slight cracks on one of the gates. In the experience at Tacony it was found possible to take a casting from each mold every 40 sec. A liberal amount of gating must be provided, rather more than in ordinary sand castings. Some of the brass founders asked whether the permanent mold might be applied to their industry. A Western firm reported that it had been experimenting on permanent molds in the brass foundry, but found that they warped after a few castings had been made. The remedy, according to Mr. Custer, is to put considerably more metal into the mold. It was also suggested that in brass casting some parts of a permanent mold should be of a substance other than iron so as to radiate the heat faster than from other portions. The casting of copper anodes in copper molds was referred to. Here the radiation of heat is so rapid that the copper in the mold is not brought up to the fusing point.

The matter of chilling elicited a good deal of comment. H. M. Lane, Cleveland, remarked that the secret of avoiding chilling lies in removing the castings from the permanent mold at a temperature above the recalescence point and just below the point at which the casting sets. Mr. Custer said that the ultimate shrinkage of castings made in permanent molds was almost the same as that for castings made in sand molds. Chilling is avoided in part by the prompt removing of the casting on setting and by the selection of the pig iron. If an iron chills in a sand mold it will chill on being cast in the permanent mold. Asked as to the limit of silicon in the pig iron to insure against chilling, he said that he would put it at 1.75 per cent. with sulphur below 0.05 per cent. The results secured in the chilling of molten iron swiftly to the point of setting and then allowing it to cool gradually were of special interest to the members of the convention. Mr. Custer showed specimens of iron treated in this way. Chemically they had the characteristics of cast iron with the exception of combined carbon, and had also some of the properties of high carbon steel. He showed a piece of cast iron containing 0.44 per cent. combined carbon and over 2 per cent. free carbon which had been tempered repeatedly and yet the common teaching is that steel will not take a temper if it contains an appreciable amount of free carbon. A plow point was shown which had been cast in a permanent mold and then plunged in water. The edge was white with a backing of gray iron.

The paper of R. H. Probert, Louisville, Ky., on "Continuous Melting," was read by title. It was published in *The Iron Age* of May 20.

Chemical Standards for Iron Castings.

One paper was brought up at the closing session of the association Friday morning, preceding the business session. It was by John J. Porter, University of Cincinnati, on "The Practical Value of Chemical Standards for Iron Castings." The author spoke of four factors on which the quality of a casting depends: The chemical

composition, the treatment which the metal has received in melting, the heat treatment—i. e., casting temperature and rate of cooling, and the perfection of the mold. As illustrating the influence of chemical composition on the cost of castings the machine tool castings commonly made in the Cincinnati District were referred to. The foundry superintendents have had it so impressed upon them that no crime is so heinous as turning out hard castings that the custom has grown up of using from 0.25 to 0.50 per cent. more silicon in the mixture than is necessary. For the extra silicon the foundryman pays more money needlessly. A number of examples were cited of the penalty paid by some foundry operators for their lack of knowledge of the chemistry of cast iron. The author suggested that the association undertake to classify castings according to the physical properties which are of importance in them and then tabulate the chemical compositions which are found suitable for each class. It would also be desirable to show where possible how the foundryman could cut down cost of iron without decreasing the quality of his product.

Secretary Moldenke said that a good many requests came to him for mixtures adapted to certain classes of castings, and he believed Mr. Porter's plan might help inquiring foundrymen. On motion Mr. Porter was appointed chairman of a committee for the formulation of chemical standards for iron castings and he was authorized to select his associates.

Among papers read by title were the following: "Cores and Core Making," by F. K. Cheney; "Pyrometry in the Annealing Room," by S. H. Stupakoff; "Notes on Steel Scrap in the Cupola," by C. R. McGahey; "Foundry Costs," by B. C. Franklin; "Modern Cupola Practice," by J. C. Knoepfel; "A Comprehensive Foundry Production Tally," by C. E. Knoepfel.

BRASS FOUNDRY PRACTICE.

The paper of Secretary W. M. Corse on "The Manufacture of Red Brass Ingot" was the first to be taken up at the portion of the Wednesday morning session devoted to the American Brass Founders' Association. Only in recent years has the stigma on ingot brass been removed. The author indicated the improvements in its manufacture that had led to its extensive use in castings from which a few years ago it was debarred. Answering the question, How can the smelter afford to sell an ingot brass below the cost of new metal? he said, that buying any material in large quantities at all times makes it possible to buy for less money and, where such buying is continuous, the class of material needed can be secured to better advantage. The smelter can produce a better ingot than the brass founder can make, since the average foundry cannot afford to carry in stock enough borings of the various kinds needed to make a good ingot. The principal points of advantage in using ingot brass are uniform composition, low shrinkage in melting, decreased cost in handling, exact knowledge of the amount of impurities, saving in first cost over new metals, and value received for the price paid.

E. S. Sperry, Bridgeport, Conn., asked how low in iron it is possible to get yellow brass ingot; to which Mr. Corse replied that if yellow brass borings are used the iron will run up, by reason of being held by the oil, to 0.5 to 0.8 per cent. If yellow brass clips are used, however, the iron can be kept well down.

Waste Heat in Brass Foundries.

F. W. Reidenbach, general manager Genesee Metal Company, Rochester, N. Y., gave a brief paper on "Waste Heat." He suggested that with the large number of foundries that are to-day using special oil burning furnaces a vast amount of heat is being lost. At the works with which he is connected a steam heating plant is maintained which cares for the company's offices with the waste heat of only two No. 200 crucible furnaces, an annual saving of \$300 in fuel.

In the discussion one member suggested that before the materials used in the brass foundry are brought to the melting point 80 per cent. of the heat units go up the chimney. Another asked whether gases coming from melting furnaces do not affect the boiler tubes. Mr. Reidenbach said that occasionally a tube cracks, but the

damage from this source is not enough to be considered. The fouling of tubes with zinc where alloys containing a large proportion of zinc are melted was spoken of as likely to reduce the efficiency of the boiler, but it was said that such scale can be readily removed with a wire brush.

As indicating that theoretical savings are often more than are actually realized, the experience of the General Electric Company was cited. In its brass foundry it put in a 100-in. ventilating fan over its Schwartz furnaces and passed the gases over a heating coil, the expectation being that this arrangement could be depended on to heat the building. Considering the expense of power to run the fan and the fact that there was no heat on Sundays or at night, and that, therefore, an auxiliary heating plant was necessary, little or no economy resulted and the fan was finally taken out.

Patents on Alloys.

The paper of G. H. Clamer on "The Patent Situation in the United States Respecting Alloys" was read by Dr. F. T. F. Stephenson of Detroit. The details of the litigation between the Ajax Metal Company and the Brady Brass Company over the copper-tin-lead alloys of the former were given in the paper. The patent on these alloys was held valid in the United States Court, District of New Jersey. The court found that in order to produce these alloys a certain relative proportion of tin and copper was necessary in order to uphold the lead, resulting in a new series of alloys in which lead is above 20 per cent. The United States Court of Appeals reversed the above decision, finding that the case presented merely a change of proportions of the copper-tin-lead alloys, which change was one of degree. Since the above decision the company has applied for and been granted a reissue of its patent on the process of making these alloys, the reissued patent having the effect of an entirely new patent and making it possible to bring suit against infringers in any United States Court jurisdiction.

Pyrometry in the Brass Foundry.

At the second session for the reading of papers on brass founding C. H. Wilson discussed "General Principles of Operation of Industrial Pyrometers." He made the point that brass founders had not shown much interest in the pyrometer, whereas steel works engineers have met the pyrometer manufacturers half way, with the result that for the steel industry heat measuring apparatus has reached a high point of development. In brass melting the great need, which has not yet been met, is such an inclosing tube as can be put in molten brass and will stand up continuously, so that reliable results can be secured without frequent renewals and repairs.

The paper, "Notes on Brass Melting," by Charles T. Bragg, was read by title, and the subject of "Melting Brass Turnings in the Oil Furnace," as presented by E. H. McVeen, was taken up by the convention. The author presented results of the experience of the F. W. Wakefield Brass Company, Vermillion, Ohio. A stationary oil furnace was used that takes two No. 30 crucibles in one chamber using an air pressure of 7 lb. and consuming 3 gal. of fuel oil to 100 lb. of brass melted, with a loss of 3 per cent. in metal, crucibles averaging 20 to 25 heats. Two hours' time is consumed in melting 200 lb. of metal, 30 lb. being gates and sprues, and the balance turnings. The turnings melted are from yellow brass stock rods, their composition averaging about 60 per cent. copper, 36 per cent. spelter and 4 per cent. lead.

In the discussion it developed that practice varies widely in the oil and air pressure used with brass melting furnaces. The air pressure of 7 lb. used by the writer of the paper was questioned by some members, who employ scarcely more than that many ounces of pressure. One member referred to practice in which 45 lb. oil pressure and 14 to 16 oz. air pressure were used with a tilting crucible furnace. Another mentioned 20 oz. air pressure with each of the two types of brass melting furnace used in his foundry. Still another, who had gravity feed for oil, created surprise by saying that he used 45 lb. air pressure, taking air directly from a compressor line. Originally he had throttled this down

to a few pounds, but found better results in using it direct. The discussion developed agreement on the statement that the great desideratum in the brass foundry is a furnace that will give a reducing flame. It was intimated that a fortune awaits the inventor of such a furnace.

Mr. Corse emphasized the point made in the paper that better castings are secured by using remelted metal. Where castings for steam or hydraulic pressures are desired, remelted metal is to be preferred, since the oxide of zinc and other impurities have a better chance to come out.

Tensile Strength of Aluminum Zinc Alloys.

At the Thursday morning session of the brass founders the paper by George L. Heath on "Electrolytic Assay of Copper" was read by title, and L. W. Olsen gave a brief abstract of his paper on "A System of Distributing Waste Losses in Raw Materials to the Cost of the Finished Product." That of W. D. Bancroft on "The Tensile Strength of Aluminum Zinc Alloys" was read by Dr. Stephenson. It detailed experiments conducted by the writer. In practice it has been found that alloys of about 75 per cent. aluminum make sharp castings, with low melting point and fair strength. The sharp castings are due not so much to expansion on cooling as to superior casting properties of the metal. The only previous systematic investigation of the aluminum zinc alloys was carried on by Prof. R. C. Carpenter. Only 14 pieces were subjected to tension tests, and, as the latter were not conclusive, the author's investigation was undertaken. He found that the values obtained from alloys of from 50 to 70 per cent. aluminum depend to a large extent upon the rapidity of cooling. Professor Carpenter's values were generally lower than those in the writer's tests, except when the test pieces approached the pure aluminum end of the series. Here Professor Carpenter's results were higher. Most of the alloys tested by Mr. Bancroft showed strength of from 25,000 to 35,000 lb. per square inch, whereas Professor Carpenter obtained 25,000 lb. as a maximum.

BUSINESS SESSIONS.

American Foundrymen's Association.

The business session of the parent association was held Friday morning. The Nominating Committee consisted of J. S. Seaman, Pittsburgh; George C. Davies, Philadelphia; Eugene W. Smith, Chicago; F. B. Farnsworth, New Haven, Conn., and J. W. Kissick, Columbus, Ga. Mr. Seaman presented the report, putting in nomination the following persons, who were unanimously elected:

President, Arthur T. Waterfall, Russel Wheel & Foundry Company, Detroit, Mich.

Vice-Presidents—First district, F. B. Farnsworth, McLagon Foundry Company, New Haven, Conn.; second district, Walter Wood, R. D. Wood & Co., Philadelphia, Pa.; third district, Joseph T. Spear, Pittsburgh Valve, Foundry & Construction Company, Pittsburgh; fourth district, Eugene W. Smith, Crane Company, Chicago; fifth district, T. W. Sheriff, Sheriff's Mfg. Company, Milwaukee, Wis.; sixth district, Alfred E. Howell, Phillips & Buttorf Mfg. Company, Nashville, Tenn.; seventh district, William Gilbert, Buckeye Foundry Company, Cincinnati; eighth district, A. F. N. Clare, Clare Stove Company, Preston, Ontario.

Secretary-Treasurer, Richard Moldenke, Watchung, N. J.

Mr. Anthes, the retiring president, was made an honorary member of the association, and thanks were voted to the Entertainment Committee, the authors of papers and the retiring officers. In acknowledging the honor conferred on him, Mr. Anthes said it was high time the foundrymen of the country recognized the efforts put forth by the association, and particularly by the secretary. For some years the association had been making its way on a practically empty treasury, the receipts barely covering expenses, and the secretary sometimes making an allowance from his meager salary to make ends meet. The upshot of the discussion started by Mr.

Anthes' remarks was the passing of a resolution introduced by H. E. Field, Pittsburgh, providing that the question of increasing the annual dues from \$5 to \$10 be submitted again to a letter ballot, and that if two-thirds of those voting were favorable to the proposition the increase be put into effect.

Foundry Iron Specifications.

H. E. Field, chairman of the Committee on Standard Specifications for Foundry Iron, presented the following specifications as the joint proposal of the American Foundrymen's Association and the Pig Iron Committee of the American Society for Testing Materials. The first draft of this report, as presented to the Philadelphia Foundrymen's Association, was published in *The Iron Age* of April 15, 1909, page 1195. Changes have since been made by the committee, however, and the revised recommendations are therefore printed here as follows:

PROPOSED STANDARD SPECIFICATIONS FOR BUYING FOUNDRY PIG IRON.

It is recommended that foundry pig iron be bought by analysis, and that when so bought these Standard Specifications be used.

Percentages and Variations.

In order that there may be uniformity in quotations, the following percentages and variations shall be used. (These specifications do not advise that all five elements be specified in all contracts for pig iron, but do recommend that when these elements are specified the following percentages be used.)

Silicon. (0.25 allowed either way.)	Sulphur. Maxi- mum. Code.	Total Carbon. Mini- mum. Code.
Code.	0.04 (Sa)	3.00 (Ca)
1.00 (La)	0.05 (Se)	3.20 (Ce)
1.50 (Le)	0.06 (Si)	3.40 (Ci)
2.00 (Li)	0.07 (So)	3.60 (Co)
2.50 (Lo)	0.08 (Su)	3.80 (Cu)
3.00 (Lu)	0.09 (Sy)	
Manganese. (0.20 either way.)	0.10 (Sh)	Phosphorus. (0.150 either way.)
Code.		Code.
0.20 (Ma)		0.20 (Pa)
0.40 (Me)		0.40 (Pe)
0.60 (Mi)		0.60 (Pi)
0.80 (Mo)		0.80 (Po)
1.00 (Mu)		1.00 (Pu)
1.25 (My)		1.25 (Py)
1.50 (Mh)		1.50 (Ph)

Percentages of any element specified half way between the above shall be designated by the addition of the letter X to the next lower symbol.

In case of phosphorus and manganese, the percentages may be used as maximum or minimum figures, but unless so specified they will be considered to include the variation above given.

Sampling and Analysis.

Each carload or its equivalent shall be considered as a unit in sampling.

One pig of machine cast or one-half pig of sand cast iron shall be taken to every four tons in the car, and shall be so chosen from different parts of the car as to represent as nearly as possible the average quality of the iron.

Drillings shall be taken so as to represent fairly the composition of the pig as cast.

An equal weight of the drillings from each pig shall be thoroughly mixed to make up the sample for analysis.

In case of dispute, the sample and analysis shall be made by an independent chemist, mutually agreed upon, if practicable at the time the contract is made.

It is recommended that the standard methods of the American Foundrymen's Association be used for analysis. Gravimetric methods shall be used for sulphur analysis, unless otherwise specified in the contract.

The cost of resampling and reanalysis shall be borne by the party in error.

Base or Quoting Price.

For market quotations an iron of 2 per cent. in silicon (with variation of 0.25 either way), and sulphur 0.05 (maximum), shall be taken as the base.

Base Table.

The following table may be filled out, and may become a part of the contract; "B," or Base, represents the price agreed upon for a pig running 2.00 in silicon (with allowed variation of 0.25 either way) and under 0.05 sulphur. "C" is a constant differential to be determined at the time the contract is made.

Sulphur.		Silicon									
3.25	3.00	2.75	2.50	2.25	2.00	1.75	1.50	1.25	1.00		
0.04	B+6C	B+5C	B+4C	B+3C	B+2C	B+C	B	B-1C	B-2C	B-3C	B-4C
0.05	B+5C	B+4C	B+3C	B+2C	B+1C	B	B-1C	B-2C	B-3C	B-4C	B-5C
0.06	B+4C	B+3C	B+2C	B+1C	B	B-1C	B-2C	B-3C	B-4C	B-5C	B-6C
0.07	B+3C	B+2C	B+1C	B	B-1C	B-2C	B-3C	B-4C	B-5C	B-6C	B-7C
0.08	B+2C	B+1C	B	B-1C	B-2C	B-3C	B-4C	B-5C	B-6C	B-7C	B-8C
0.09	B+1C	B	B-1C	B-2C	B-3C	B-4C	B-5C	B-6C	B-7C	B-8C	B-9C
0.10	B	B-1C	B-2C	B-3C	B-4C	B-5C	B-6C	B-7C	B-8C	B-9C	

(This table is for settling any differences which may arise in filling a contract, as explained under "Penalties" and "Allowances," and may be used to regulate the price of a grade of pig iron which the purchaser desires, and seller agrees to substitute for the one originally specified.)

Silicon percentages allow 0.25 variation either way. Sulphur percentages are maximum.

Penalties.

In case the iron when delivered does not conform to the specifications, the buyer shall have the option of either refusing the iron, or of accepting it on the basis shown in the above table, which must be filled out at the time the contract is made.

Allowances.

In case the furnace cannot for any good reason deliver the iron as specified at the time delivery is due, the purchaser may at his option accept any other analysis which the furnace can deliver. The price to be determined by the Base Table, which must be filled out at the time the contract is made.

EXCEPTIONS TO THE SPECIFICATIONS.

In the discussion of the report Elliot A. Kebler of Matthew Addy & Co., Cincinnati, took exception to several features, particularly opposing the requirement that the gravimetric method be used for sulphur analysis. Foundrymen, he said, should not adopt this method as a standard until they are willing to receive an iron apparently higher in sulphur than is specified in their contracts. It is not yet proven that an iron which shows volumetrically 0.045 per cent. sulphur and gravimetrically 0.055 per cent. is a poorer iron than one which shows 0.045 per cent. sulphur by both methods. He objected also to the silicon table. If this table were adopted as shown, with its allowable variation of 0.25 per cent., cases would arise in which the customer would receive on iron with exactly the specified silicon contents. The question would come up whether he would pay for the iron on the basis of that exact silicon percentage or of a silicon percentage 0.25 per cent. higher or lower than that specified. The same objection, he said, applied to the manganese schedule, where the allowable variation is exactly the same as the differential between grades. Referring to the matter of carbon, he thought that as carbons are very rarely determined it would be well to omit total carbon from the specification. In Mr. Kebler's opinion no specification should be adopted as a standard by the American Foundrymen's Association until it is shown by letter ballot that it meets the approval of a large proportion of the foundries and also of the blast furnaces.

Mr. Field replied that the chief difficulty about sulphur analysis was in the case of irons made from Cornwall ores, which contain copper. The evolution method, with such iron would show only a portion of the sulphur actually contained. The gravimetric method is the only way, he said, to insure accurate determination of sulphur. Dr. Moldenke emphasized the importance of accurate sulphur determinations. Answering the statement made by one of the chemists present, that the evolution method would require double the present force in commercial laboratories to get the sulphur content gravimetrically, he said that the association ought to lead on matters of this kind and not be satisfied with anything tending to inaccuracy. He had heard a good deal of complaint from foundries, of the results of some of the work in foundry chemistry done by commercial chemists. He believed wherever methods commonly used give untrustworthy results they should be changed.

The vote on the adoption of the specification presented by the committee showed that the few foundrymen present were in favor of it, the negative votes being cast by representatives of laboratory and pig iron interests.

Detroit for the 1910 Convention.

The invitation for next year's convention was presented by Dr. F. T. F. Stephenson on behalf of the foundries of Detroit. Mention was made of the very considerable entertainment fund already provided and of the advantages offered by Detroit for the holiday on

May 30, which in 1910 falls on Monday, the plan being to have the convention in the week beginning with that date. The matter was referred to the Executive Committee with the recommendation that Detroit be selected for 1910. On behalf of Pittsburgh foundrymen Messrs. Seaman and Spear gave an invitation for 1911. The secretary stated that Milwaukee would probably want the convention of 1912 and that Niagara Falls was urging its claims for the first open year.

A Steel Founders' Section.

Secretary Moldenke brought up a suggestion that had been made for the formation of a separate section or association for steel foundry interests, similar to that now existing for the brass foundries. The Executive Board was asked, on motion, to take the matter under consideration and ascertain whether the steel foundry industry would favor the formation of a separate association for the reading and discussion of papers.

Brass Founders' Association.

The annual business meeting the American Brass Founders' Association was held Wednesday afternoon. The committee to nominate officers consisted of Dr. F. T. F. Stephenson, consulting chemist, Detroit; A. L. Haasis, Dixon Crucible Company, Jersey City, N. J.; F. A. Coleman, J. D. Smith Foundry Supply Company, Cleveland, Ohio; J. J. Wilson, Cadillac Motor Company, Detroit; A. P. Ford, Crane Valve Company, Bridgeport, Conn. The report was presented by Dr. Stephenson, and on his motion the following were elected officers for the ensuing year:

President, William R. Webster, Bridgeport Brass Company, Bridgeport, Conn.

Vice-Presidents: Edward O. Goss, Scoville Mfg. Company, Waterbury, Conn. (representing rolling mills); first district, A. H. Warner, Stebbins Mfg. Company, Springfield, Mass.; second district, W. L. Abate, Nathan Mfg. Company, New York; third district, Thomas Evans, Eynon-Evans Mfg. Company, Philadelphia; fourth district, L. W. Olsen, Ohio Brass Company, Mansfield, Ohio; fifth district, J. N. Gamble, National Tube Company, Kewanee, Ill.; sixth district, W. D. Allen, W. D. Allen Mfg. Company, Chicago, Ill.; seventh district, J. Cessna Sharp, John C. Sharp Brass Works, Chattanooga, Tenn.; eighth district, N. K. B. Patch, Lumen Bearing Company, Toronto, Ont.; ninth district, Richard R. Mitchell, Robert Mitchell Company, Montreal, Can.

Secretary and Treasurer, W. M. Corse, Michigan Smelting & Refining Company, Detroit, Mich.

A Committee on Standardization was appointed, consisting of Secretary W. M. Corse, E. S. Sperry, Bridgeport, Conn., and A. D. Little, Boston. This committee is charged particularly with the formulation of standards for the analysis of brass and other alloys. Dr. W. F. Hillebrand, representing the U. S. Bureau of Standards, was present at the convention and met with the above committee to lay out plans for the work. Mr. Corse represented the American Chemical Society as well as the Brass Founders' Association on the committee, the former society having promised co-operation in the work.

Associated Foundry Foremen.

The annual meeting of the Associated Foundry Foremen was held in Music Hall Wednesday evening. The election of officers resulted in the choice of the following:

President, Lagene W. Smith, Chicago, Ill.

First Vice-President, W. F. Gruman, Erie, Pa.

Second Vice-President, J. L. Marshall, Milwaukee, Wis.

Secretary and Treasurer, C. E. Hoyt, Chicago, Ill.

Other vice-presidents of the association are the presidents of the various local associations of foundry foremen.

A committee of five was appointed to rewrite the constitution—a matter that has been under discussion at the annual meetings of the association for several years. When the committee's work is finished the revised constitution will be submitted to the membership by letter ballot. The treasurer's report showed a balance of \$294.08.

The Foundry Supply Association.

Through the courtesy of President Perkins, First Vice-President E. J. Woodison, Detroit, the city which is to entertain the allied organizations next year, presided at the business meeting of the Foundry and Manufacturers' Supply Association at the Sinton Friday evening, May 21. Dr. Frank T. F. Stephenson, who was Detroit's champion at the convention, opened the meeting with a forceful address, presenting the formal invitation of that city.

Secretary Hoyt's report showed \$8400 worth of space sold, \$2500 received during the year from dues and \$750 from initiation fees. Gate receipts were something over \$1000, and the total receipts exceeded \$13,000. The close of the meeting found practically \$6000 in the treasury. The following officers were elected unanimously:

President, F. N. Perkins, Arcade Mfg. Company, Freeport, Ill.

Vice-Presidents, Frederick B. Stevens, Detroit, Mich.; R. S. Buch, A. Buch's Sons, Elizabethtown, Pa.; S. T. Johnston, S. Obermayer Company, Chicago; William Lodge, Lodge & Shipley Machine Tool Company, Cincinnati.

Secretary, C. E. Hoyt, Lewis Institute, Chicago.

Treasurer, J. S. McCormick, J. S. McCormick Company, Pittsburgh.

Trustees, three years—E. A. Pridmore, Henry E. Pridmore, Chicago; George H. Wadsworth, Falls River & Machine Company, Cuyahoga Falls, Ohio; H. R. Atwater, Osborn Mfg. Company; E. J. Woodison, Detroit Foundry Supply Company, Detroit (to fill unexpired term of S. T. Johnston).

A resolution adopted by the association, calling for the elimination of souvenirs, was referred to the Executive Committee to devise ways and means. It was also the sense of the meeting that the levying of an extra tax of \$5 each on additional firm representatives at exhibitions was objectionable, and its elimination was also referred to the Executive Committee. At the executive meeting following the open session a project of President Perkins was formally adopted. This is an arrangement whereby a roster or directory of the association membership will be published on a page in such technical journals as may be invited to co-operate with the organization and under such contract as shall be prepared and sent out soon by Secretary Hoyt.

Detroit was unanimously chosen as the meeting place for 1910.

THE EXHIBITS.

The number of exhibits at the Cincinnati convention exceeded by three those shown at the Toronto meeting, and was identical with the Philadelphia representation, namely, 70. Over 100 shipments by freight were made from outside points, and their weight, exclusive of express matter, generators, air compressor, motors, &c., used by courtesy of manufacturers, was 367,640 lb. In addition there were two carloads of molding sand distributed throughout the exhibition, which covered the entire floor space of Machinery Hall of the Exposition Music Hall group and also called for a temporary building constructed on the canal banks in the rear. Power was supplied in both buildings. For the large hall, an 80 hp. motor, and distributed through the display, seven 10 hp., two 5 hp., one 6½ hp., two 1 hp., one 2 hp., one 3 hp., and one 7½ hp. direct connected type K motors were furnished by the Allis-Chalmers Company. Compressed air at 80 lb. pressure, developing 427 cu. ft. per minute was furnished by a compressor of the Chicago Pneumatic Tool Company. Several entirely new devices and features of molding were shown which were operated at intervals daily. Particularly worthy of note is the amount of business booked by exhibitors; in some instances the entire list of machinery or devices shown was sold for shipment to other points.

Another feature was the large number of machinery utilizing power; in the main building, 175 hp. was developed and in the annex 51, a total of 226. The displays are described below:

Millers' Products Company, Chicago: Distributed printed matter and souvenirs advertising Black Diamond core compound. Represented by C. B. Spaulding, manager; S. H. Baird, Eastern representative at Philadelphia; Joseph Harrison, Wisconsin representative; William J. Brant, Pittsburgh; N. T. McGrath, of Chicago office.

Lane & Bodley Company, Cincinnati: One 150-hp. latest design single eccentric heavy duty Corliss engine. Represented by J. J. Tice.

Hawley Down Draft Company, Chicago: Full line of furnaces, one 90-in. steel furnace, 10,000 lb.; one 32-in. brass furnace, 500 lb.; one 400-lb. Reylbec coke crucible furnace (sold for export to Germany). In the temporary building, one 42-in.

- Hawley-Schwartz furnace in operation, capacity 500 lb. in 15 min. Representatives: F. C. Ringer and T. P. Gurvey, New York office; C. M. Bleyer and D. O'Brien, Chicago office.
- Tabor Mfg. Company, Philadelphia: Demonstration of power squeezers, power split patterns, power roll-overs, hand roll-overs, jarring machines, combination jarring machine with power roll-over, stripping plate machines, Taylor-Newbold saw. The feature was the new power jarring machine and roll-over combination.
- Falls Rivet & Machine Company, Cuyahoga Falls, Ohio: Booth fitted up as model core room, showing Wadsworth core machines, quick speed changing core cutting off and coning machine, power and electrically driven; Wadsworth core ovens and a display of standard core prints made and supplied the trade; also showed sand crusher compounding mill to take care of core machine mixtures exclusively; capacity 3000 lb. per day.
- Oliver Machinery Company, Grand Rapids, Mich.: Wadkins' universal woodworker, an English machine designed to fill the same gap in pattern shop that the universal milling machine does in the machine shop; also patterns showing the possibilities of the machine, including core boxes, worms and gears, and all intricate pieces that enter into pattern shop work. Demonstrated also the No. 144 hand planer and joiner, with the Oliver safety cylinder. Representatives: J. P. Schmidt and Walter Y. Mentzer, operators of the Wadkins machine; Vice-President A. N. Spencer, Sales Manager R. O. Lovell from Pittsburgh office.
- Browning Engineering Company, Cleveland: Armington hoists, jib cranes and a general line of engineering work for Victor R. Browning Company, in connection with display of locomotive cranes, magnets, buckets, &c., for Browning Engineering Company.
- Brown Specialty Machinery Company, Chicago: Core room equipment, the hammer core machine, coning machines; samples of Diamond pattern lumber. Represented by E. A. Rich, manager.
- Arthur Koppel, New York: Exhibited a line of foundry trucks, turntables, &c.
- Detroit Foundry Supply Company, Detroit, Mich.: Foundry supplies. E. J. Woodson and W. B. Howard.
- Hickman, Williams & Co., Cincinnati office: Visitors' rest booth, with displays of 21 brands of pig iron and variety of coke samples. The resident partner at Cincinnati assisted by Baylor Hickman of the Louisville office and Ray Fox, H. Black, J. U. Byrd, P. Henslerling and E. Leitch of the Cincinnati office force entertained visitors.
- George F. Crivel & Co., Buffalo, N. Y.: Foundry facings and supplies. Headquarters fitted up for the entertainment of friends and visitors to the convention.
- Berkshire Mfg. Company, Cleveland: Showing a combined hand squeezing and pattern drawing machine, with flask 14 x 24 in operation; also Berkshire A molding machine, taking a flask up to 14 x 22 in. with sand conveyor and rotary riddle operating on an assorted work in 14 x 18 flask; variety of sample castings showing the work done on the machine. Represented by J. N. Battenfield, vice-president and manager.
- Oscar Barnett Foundry Company, Newark, N. J.: Line of iron flasks for iron, steel and brass foundry use. Represented by F. S. Barnett.
- Holland Linsed Oil Company, Chicago: Demonstration of Holland core oils, making and baking cores, using the Holland oils in the mixture in the proportions of one of oil to 60 of sand. Represented by P. M. Baumgardner, president; Charles Nelson and P. C. Crawford.
- American Smelting & Refining Company, Cincinnati: Showed samples of pig and bar tin, pig and bar lead, ingot copper, ingot brass.
- Diamond Clamp & Flask Company, Richmond, Ind.: Automatic core machines in operation, making all kinds of special cores such as are used in fittings, including valves, tees, &c. A plunger type core machine was shown making stock and irregular cores. Included also in the exhibit were Diamond screw and type machine, coning machine, flasks and slip box, pattern making chuck, pattern trimming tool, &c. Demonstrators, William Garside and G. E. Johnson.
- Sterling Wheelbarrow Company, Milwaukee: Displayed steel foundry flasks, barrows and trucks. I. R. Smith, superintendent, in charge.
- Sand Mixing Machine Company, New York: Demonstrated an automatic sand mixer driven by a 5-hp. electric motor. V. E. Minich in charge.
- Ed. E. Squier Company, St. Louis: A comprehensive line of foundry sand, covering requirements for superior brass to heaviest machinery castings. Core sands, such as white silica, lake, magnesite and lake, sand blast sand and quartz. Specimen castings made with these different varieties of sand were also shown. Secretary R. H. Squier and E. E. Squier in attendance.
- Stanley Doggett, New York: Showed samples of parting, cast steel cement, foundry talc, pulverized charcoal, metal workers' crayon, manganese dioxide for brass foundries. Souvenirs, mirrors and pin cushions. A. J. Johnson in charge.
- Kroeschell Brothers Company, New York: Showed in operation the Kroeschell-Schwartz gyrating flame stationary crucible furnace equipped with oil pumping and blower system, adapted for melting the softer metals, using both oil and gas for fuel. Also gas stove for drying molds. William Kroeschell and E. H. Schwartz in attendance.
- Gutlick-Henderson Laboratories, Pittsburgh and Chicago: Represented by J. W. Henderson, Pittsburgh, and B. B. Stroud. Booklets and pictures.
- Cleveland Wire Spring Company, Cleveland, Ohio: Showed steel shop boxes, steel shop barrels, springs and other factory equipment.
- Manufacturers' Equipment Company, Chicago: Demonstrated the use of the Aero chucks, Aero countershaft and special tools used in brass manufacturing. The feature was the showing of the new two-jaw universal Aero chuck. Paul J. Grebel, president, Chicago, in attendance.
- Newport Sand Bank Company, Newport, Ky.: An artistic display of 16 varieties of molding sand mined and shipped by the company; also samples of work in brass, iron, stove, radiator and hardware castings showing the possibilities of the sand. Represented by President J. Frank Dye.
- J. S. McCormick Company, Pittsburgh: Demonstrations of the McCormick continuous sand mixer and the Invinible magnetic separator. Taper flasks, ladles, samples of blacking, facing, Niagara sand blast, McCormick blacking sprayer, &c. The "McCormick Roadster," the familiar old bicycle built of smaller foundry supplies, attracted the usual amount of attention. Representatives: J. S. McCormick, president; T. E. Malone, secretary, and S. R. Costley.
- Arcade Mfg. Company, Freeport, Ill.: This company had a very expensive exhibit, showing two No. 1 and a No. 2 modern molding machine in operation and the Buck's roll-up device for making large parts of stove plate usually made in roll-up flasks. Also demonstrated the Norcross jolt ramming machine (new), ramming anything from an engine bed to a locomotive grate in about 30 seconds. An example was furnished in the record made at the Terre Haute plant of the American Car & Foundry Company in making locomotive stacks, mold 4 x 8 x 16 in., flask weighing 1000 lb. Ramming on 15-in. machine reduced the molding cost from \$4.50 per piece to \$2.25 per piece. A record from the Michigan Stove Company, furnished by that company, was shown in a series of framed illustrations. Produced 240 molds, 8-in. covers, 11 x 20 flask, in 7 hr.; 225 molds, cut centers, 11 x 19 flask, in 7 hr.; 130 molds, 18-in. gas stove burners, 10 x 22 flask, in 7 hr.; 273 molds, 7-in. name plate, 11 x 19 flask, in 7 hr. Representatives in attendance: E. H. Morgan, president and treasurer; Charles Morgan, vice-president and superintendent; L. L. Munn, secretary; F. N. Perkins, G. D. Wolfley, salesmen; R. M. Burton, molding machine demonstrator.
- E. H. Mumford Company, Philadelphia: Joint exhibit and demonstration with the Curtis & Co. Mfg. Company, exhibiting the new overhead molding machine for large work, known as the Curtis-Mumford Overhead Molder, operated over the large jolt ramming machine of the Arcade Mfg. Company. The machine shown was gauged to handle flasks up to 8 ft. long and 7 ft. wide and of 9000 lb. weight. It also molds and draws pattern of any size up to capacity in 1 to 2 min. Also demonstrated 10-in. high trunnion squeezer, 12-in. and 13 x 18 split pattern machine. E. M. Zwing in charge for Mumford and E. H. Steedman for Curtis.
- William Sellers Company, Inc., Philadelphia: Exhibited two centrifugal sand mixers, one belt and one motor driven; the latter in operation, demonstrating how thoroughly sands of all kinds can be mixed by machinery. Edward L. Holljes in charge.
- Joseph Dixon Crucible Company: Showed crucibles for melting steel and the non-ferrous metals; also some that had done duty years ago. An arrangement of electric lights and strips of red tissue paper blown into the air from a box created an interesting optical illusion. Representatives at the booth: Sam Mayer, W. B. Allen, F. R. Brandon and D. A. Johnson, from the Chicago office; A. L. Haasis, George Neighbor, De Witt C. Smith and John A. Condit, Jersey City; Frank Krug, Philadelphia; William Coane and Samuel Dougherty, St. Louis.
- The J. A. Fay & Egan Company, Cincinnati: An interesting working exhibit of woodworking machinery—a No. 156 planer, No. 50 band saw, No. 195 hand planer, No. 205 circular saw, all electrically driven. Represented by C. P. Egan.
- H. E. Pridmore, Chicago: Showed in operation the large rock-over drop machine for jobbing work, the small machine for same class of work, stripping plate machine, stove plate rockover drop machine for large stove work and small stove plate machine. The special stoveplate rockover drop machine exhibited for the first time; also a power ramming rockover drop molding machine. In charge: E. A. Pridmore, president; H. A. Pridmore, D. F. Egan, W. W. Miller, R. E. Turnbull and W. H. Phinney.
- S. Obermayer Company, Cincinnati: Two booths, one in connection with the Whiting Foundry Equipment Company, Harvey, Ill. Equipment department demonstrating Kant-beat core compound, making and baking cores. Showing rosin grinder, water rumble, iron flasks, brass melting furnace, core ovens, electric chipping hammer, both foot and power sprue cutters, hand sand sifting machine, electric power sand sifting machine, cupola linings, &c. In this department also was demonstrated a new type tool manufactured by the Cincinnati Electrical Tool Company, which is creating considerable interest among foundrymen. In attendance daily were: Vice-President Justus Thorne, General Manager H. F. Frohman, Advertising Manager J. Cecil Nuckols, Equipment Manager S. T. Johnston; James A. Evans, O. J. Peterson, J. McDevitt, C. M. Gardner, George Kersting; William J. Fitzpatrick (demonstrator), Fred J. Brunner, Lawrence Gosiger; E. D. Frohman, manager Pittsburgh office; Theodore Kaufman, Chicago manager; H. Mende, superintendent and chemist; I. W. Becker, Henry Schuh, Harry Kuekemuller, Ben Schroeder.
- Lodge & Shipley Machine Tool Company, Cincinnati: The only machine tool concern exhibiting this year. It showed an engine lathe, 24 in. by 12 ft., patent head. President William Lodge was in frequent attendance.
- Pickands, Brown & Co., Chicago: Samples of Solvay, by-product coke, photos of plants, various brands of pig iron, &c. George A. T. Long in charge.
- Whiting Foundry Equipment Company, Harvey, Ill.: Showed tumbling mills, ladles and turn-tables. Exhibit in connection with S. Obermayer Company. Installation showing electrical brake hoisting motor and mechanical brake combined on electric traveling crane. Messrs. Brandon and Hammond in charge.
- Foundry Specialty Company, Cincinnati: Demonstrated parting for brass and iron and flunine and facine for brass work only. In attendance: W. S. Anderson and F. W. Weissman.
- Robeson Process Company, Ausable Forks, N. Y., and Covington, Va.: A commodious rest space for visitors, enclosed with potted small trees: the young Norway spruce, which is the base of glutin, the liquid core binder; also photographs showing the use of the binder in road making. D. S. Robeson in attendance.
- Gravity Molding Machine Company—A. Buch's Sons Company, Elizabethtown, Pa.: Showed the improved No. 2 gravity molding machine in operation daily from 9 to 10 and 11 to 12 a. m., and 2 to 3 and 4 to 5 p. m., taking in flasks 44 x 44 in. square, working on crusher wheels; large variety of finished castings; portable jar molding machine, making stove plate and large line of small machinery castings; also large line of new type slip flasks.
- E. Killing's Molding Machine Works, Davenport, Iowa: Demonstrated three different types of the Killing universal roll-over straight drop machine; also displayed complete line of steel flasks. Represented by E. Killing, proprietor; H. W. Langfelter, salesman, and C. P. Aadye, demonstrator.
- Walter McLeod & Co., Cincinnati: Showed oil furnaces, sand blast, water softeners, blacking swabs, whitewash sprayers and drivers, &c. W. F. Stodder in charge.
- Goldschmidt Thermit Company, New York: Demonstrated the use of thermit in welding steel and cast iron. A. M. Guenther, mechanical engineer, New York, in charge.
- Osborn Mfg. Company, Cleveland: Made a feature of the Stiv-quick riddle, sifting sand from both bottom and sides.

- Showed rock-over drop draft molding machines, and a line of general foundry supplies.
- Carborundum Company, Niagara Falls, N. Y.: Carborundum wheels for foundry use, with samples of all grits manufactured by the company. Representatives in charge: Geo. R. Rayner, H. W. Eaton, W. W. Sanderson and R. B. Fuller.
- S. Birkinstein & Sons (in connection with Globe Metal Company), Chicago: Samples of phosphor bronze, brass ingots and other metals for brass foundries. Headquarters for the brass foundry visitors. Souvenirs: small metal pots, paper weights, red and yellow brass. In charge: Louis Birkinstein, Sam Rush, E. E. Berliner, J. N. Nieman.
- Calumet Engineering Works, Harvey, Ill.: Showing model of Calumet cupola, ladle, patent air hoist valve, pictures of cranes, &c. In charge of O. G. Lewis, engineer, and R. Scully.
- W. W. Sly Mfg. Company, Cleveland: Showed photos of exhaust tumbling barrels, water cylinder mill, dust arresters, &c. Souvenirs: manicure files. In charge: W. W. Sly, W. C. Sly, D. A. Livensparger, H. R. Morse.
- Hill & Griffith Company, Cincinnati: General line of foundry equipment and supplies; the Peerless perforated chaplets; a Murphy wax wire machine; facine and castings made by National Cash Register Company, Dayton, Ohio, using facine; patent clamps and other modern foundry features. President Hill in attendance.
- Burroughs Adding Machine Company, Detroit: Rest room and a line of machines, including cost keeping machines for foundries.
- J. W. Paxson Company, Philadelphia: Showed a line of supplies; magnetic separator, Glenwood rock-over molding machine, adapted for general jobbing foundries; making a feature of the double head roll-over machine adapted for brass foundries only, taking standard bevel ribbed iron flasks operating on any kind of job or patterns in brass foundry. Brass furnaces, crane ladles, pneumatic tripod safety machines, aluminum flasks, match plates, &c. In charge: H. M. Bougher, president; L. A. Crandall, manager Western branch at Toledo, Ohio; I. F. Kremer, assistant superintendent of shops, and George Moore, molding machine representative.
- Frederick B. Stevens, Detroit: General line of foundry supplies. Baird & West, Detroit, Mich.: By-product coke for foundry use.

Temporary Building.

In the temporary building adjoining Machinery Hall, a number of important working and demonstrating exhibits were placed. Several new devices for foundry work were shown for the first time, and a particularly fine display of melting furnaces and new mechanical equipment. In this building were the following:

- J. D. Smith Foundry Supply Company, Cleveland, Ohio: Showed a new semi-portable style of rolling drawer oven to fill the existing gap between portable and stationary type of oven complete; Cleveland water tumbling barrel; Cleveland molding machine; complete setting brass furnace showing patent swing cover and drop grates; also Cleveland sprue cutter, the largest machine manufactured; Cleveland blacking mixer, for mixing large batches of blacking for pipe shops and ingot mold foundries, operating continuously; automatic mixing apparatus.
- Herman Pneumatic Machine Company, Zellenople, Pa.: Showed class B jarring machine, taking in flask 24 x 30 in., with turn-over and pattern drawing device; jarring machine with 60 x 72-in. table; also roll-over device and combination machine—all in operation. All machines were sold. C. E. Pettie, works manager, in charge.
- Standard Sand & Machine Company, Cleveland: A special feature of the temporary building: a conveying machine representing five distinct operations in one, viz., proportioning, magnetic separating, screening, mixing and tempering; rolling, kneading and blending; 5, 10 and 15-ton sizes. The machine is the first one made by the inventor, H. G. Boughton, who is arranging to put it on the market at once. It is designed for steel and iron foundries engaged on heavy work.
- Hauck Mfg. Company, New York: Display of mold dryers, ladle heaters, &c., in operation. A. E. Hauck, Brooklyn, and A. B. Link in charge.
- M. H. V. furnace, an English invention, shown by R. F. Goyne, representing the owners; a melting furnace in operation, using 1 lb. coke to 8 lb. of metal, seven heats per day, of 425 lb. each. Claimed that quality of metal is superior to the product of types where metal is melted by flame in direct contact. American right bought by J. B. Wise, Watertown, N. Y., who will market it.
- Monarch Engineering & Mfg. Company, Baltimore: Showed two tilting furnaces and one stationary crucible Steele-Harvey furnace for oil or gas. Poured several heats daily into ingots. Also ladle heater, rivet furnace, core oven and portable heater and Monarch No. 6 blower.
- Rockwell Furnace Company, New York: Showed in operation soft metal furnace, tilting crucible furnace, open flame simplex furnace and Rockwell double chamber furnace. Exhibited also the new pit type lift out crucible furnace, which is made any size, single or in batteries. A Sturtevant No. 6 blower was used in the demonstrations.

BRIEF MENTION.

The American Foundrymen's Association has almost reached the point where a veterans' organization might be formed. The old guard is small in comparison with the army of foundrymen who have come to the front in the last half dozen years. Among the most regular attendants of the conventions since the association was organized in Philadelphia in 1896 are Thomas D. West, Cleveland, Ohio; J. S. Seaman, William Yagle and F. H. Zimmers, Pittsburgh; T. J. Best, Montreal, Canada; James F. Lanigan, Lawrence, Mass., and F. B. Farnsworth, New Haven, Conn.

The malleable castings manufacturers of the Central and Western States held a meeting in Cincinnati on the second day of the convention. While the general report was one of improvement in the volume of business, it was also agreed that there had been for some months an alternation of slack and active periods. At times com-

petition has been severe and low prices have been made, attributable in part to the coming of two or three new firms into the business in the past 18 months.

Cincinnati is an important selling center for foundry pig iron. Naturally the gathering there of hundreds of foundrymen led to a general interchange of views by buyers and sellers. As illustrating the small margin on which some sellers of pig iron have been working in recent months the expression of one of them is interesting: "I told one of our customers this week who had just bought from us that we were very glad to book his order. 'At the same time,' I said, 'on second thought we felt sorry the other fellow didn't get it.'"

Cincinnati has a reputation, which goes back to similar conventions in the 90's, for taking good care of visiting foundrymen, and the cordiality of the reception and entertainment committees was in evidence this year in the old-time way. The river excursion Thursday on the steamer Island Queen, on which the plans of the committee centered, was marred by an all day rain. However, many hundreds enjoyed it, with full appreciation of the spirit it represented.

George E. Nye attended the convention to present the inducements Niagara Falls offers for one of the coming conventions of the association. The waiting list is lengthening, whereas not many years back the American Foundrymen's Association meetings called out no competition whatever and sometimes were arranged for with difficulty.

Canadian Notes.

TORONTO, May 21, 1909.—The Provincial Steel Company's new works at Cobourg, Ontario, began operations this week, making rerolled rails. The formal opening was attended by many of the citizens.

The *Financial Post* of this city says that the improvement in processes at the works of the Dominion Iron & Steel Company means an economy of \$2 per ton in the cost of producing steel ingots. This, it is pointed out, is satisfactory as an offset to the dropping of the bounty.

It is said that good progress is being made in the work of raising capital for the carrying out of the rolling mill project at Sydney, N. S.

Twenty-eight students of McGill University are touring the collieries and industrial establishments of Nova Scotia.

The American Laundry Machine Mfg. Company has purchased a site in Toronto for the construction of a branch factory.

A site has been purchased in Toronto for works to be put up by the Toledo Computing Scale Company.

It is announced that the Atikokan Iron Company's furnace at Port Arthur will soon be put in operation.

C. A. C. J.

The steel freight steamship being built by the Newport News Shipbuilding & Dry Dock Company, Newport News, Va., for the A. H. Bull Steamship Company of New York is distinguished in the fact that she is the first freighter, intended for foreign trade, built in the United States during the past 10 years. Her principal use will doubtless be in coast service or until favorable opportunities offer in the foreign trade. The new steamer has the following principal dimensions: Length over all, 329 ft.; length from aft side of stem to fore side of rudder post, 317 ft.; beam molded, 46 ft.; depth molded, 24 ft. 3 in.; load draft, 20 ft.; dead weight carried on above draft, about 4600 tons.

The United States Steel Corporation emphatically denies the report that it contemplates embarking in the business of manufacturing boilers. When this report was first published it seemed too absurd to be given any attention in our columns. It is found, however, that the report has been so widely disseminated that it is regarded as true in some sections of the country. It therefore seems necessary that an authoritative denial should be made.

The Baush Three-Spindle Sensitive Drill.

To supply a machine smaller than its regular line of multi-spindle drills the Baush Machine Tool Company, Springfield, Mass., has brought out the No. 3-A sensitive drill shown in Fig. 1. The machine may be provided with four or less spindles. Three are recommended by the maker as best adapted to handle the largest amount of work and the machine has that number. Adapted for use with this machine or any single spindle drill press is the portable multi-drill head shown in Fig. 2, which is another new product of the company. The No. 3-A drill may be used with one of these heads on the middle spindle, as shown in Fig. 1, or two of the multi-drill

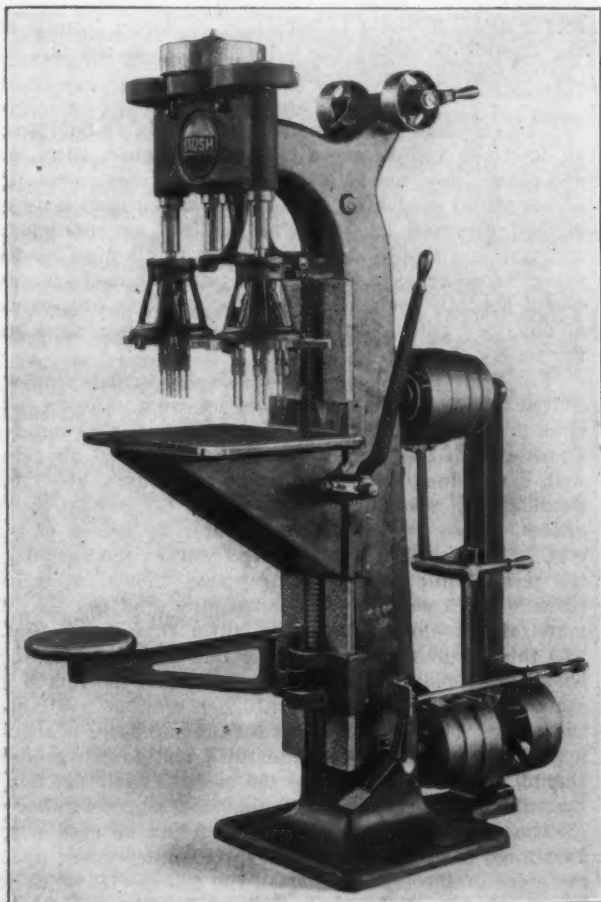


Fig. 1.—The No. 3-A Three-Spindle Sensitive Drill Built by the Baush Machine Tool Company, Springfield, Mass.

heads may be used on the outside spindles, leaving the center spindle idle. The machine, however, is a complete drill without the small multi-spindle heads, and is excellently adapted for manufacturing purposes where several operations of drilling or reaming are to be carried out on a given piece of work and can be provided for on the different spindles of this machine, doing away with the necessity of changing tools between operations.

Each of the spindles of the No. 3-A machine is capable of handling a 1-in. drill. The spindles are 7 in. apart, center to center, and have No. 3 Morse taper sockets. Through the countershaft provided on the back of the machine and the three-step cone pulleys three different spindle speeds are obtainable—272, 320 and 377 rev. per min.—with the countershaft running at 320 rev. per min. The tight and loose pulleys on the countershaft are 10 in. in diameter for a 2-in. belt, and allow stopping or starting by shifting the belt by means of the foot lever shown. A hand lever is also provided for shifting the belt on the cone pulleys. The drive of the spindles is from a pulley on the upper cone pulley shaft, which passes over the idlers supported on the top of the column to the spindle pulley. The idlers are mounted on a shaft which has eccentric bearings in the column and may be manipulated through the lever shown to vary the tension on the belt. The final driving pulley of the three spindles is

shown on top of the press and is geared to drive the three spindles.

The table is counterbalanced and has a hand lever for raising and lowering it, and is also fitted with adjustable stops. The maximum distance from the table to the spindles is 26 in. and the vertical travel of the table 22 in. On the front of the column for the operator is supported a swinging revolving top seat, adjustable in its height. The total height of the machine over all is 6 ft. 3 in., the total length 4 ft. 11 in. and the total width 28 in. The machine weighs about 1200 lb. and may be driven by a 2-hp. motor.

The portable multi-drill heads, one of which is shown in Fig. 2, are made with eight or less spindles, each

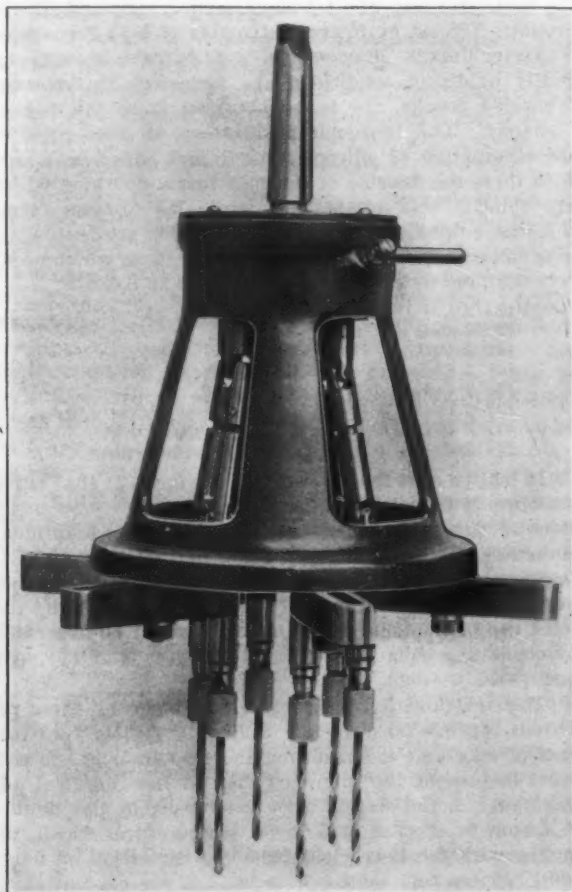


Fig. 2.—The Baush Multi-Spindle Drill Head Adapted to Be Used with the No. 3-A Machine or any Single Spindle Drill.

spindle being capable of handling $\frac{1}{4}$ -in. drills as a maximum or 3-32-in. as a minimum. The distance between the centers of the drills is variable; the minimum is $\frac{3}{4}$ in. The spindles are $\frac{5}{8}$ in. in diameter. With this head the drilling speeds obtained are 1000, 1200 and 1400 rev. per min. when the head is used in the No. 3-A machine, above described. Each spindle is fitted with a No. 3 Morse taper socket. The drilling thrust is taken by a ball thrust bearing in the head. The weight of the 5-in. head, which is equipped with six spindles, is 20 lb. The heads usually have a maximum drilling circle of 5 to 8 in., but the company is prepared to furnish any size or shape of head to suit customers' requirements.

Having passed into the hands of new interests, the Culter & Procter Stove Company, one of the oldest manufacturing concerns in Peoria, Ill., has been reorganized. The new company includes Robert D. Clarke, Garret Kinney, W. P. Colburn, Procter Cooley and A. V. Thomas. Robert D. Clarke is president, Garret Kinney is secretary and Procter Cooley is general manager. It is stated that the plans of the management embrace improvements which will greatly enlarge the plant and increase its output. New lines will be introduced and the scope of operations enlarged.

Fluorspar in Iron and Steel Making.*

Its Use in Open Hearth Furnaces and Foundry Cupolas.

BY F. JULIUS FOHS, LEXINGTON, KY.

The value of fluorspar in the manufacture of iron and steel depends upon its ability to form two types of allied slag products, whereas an acid or a basic flux forms only one. It first forms volatile acid products, in which fluorine is the controlling factor, and then basic slag forming compounds, in which calcium is the characteristic constituent. Fluorspar is chiefly serviceable, therefore, in the basic processes of steel manufacture, because both the products formed by it are destructive of acid furnace or converter linings. Basic slags, basic furnace linings, and gently oxidizing conditions are necessary if the most favorable results are to be obtained from the use of fluorspar. The thorough purification of iron requires the elimination of silicon, sulphur and phosphorus, and with these the fluorine of the spar forms fluorides, which are volatile acid compounds, while its calcium forms silicates, sulphides and phosphides, which are basic slag-forming compounds. These reactions, and those which occur between limestone and phosphorus, are as follows:

- (1) $2 \text{CaF}_2 + \text{SiO}_2 = 2 \text{CaO} + \text{SiF}_4$ and
- (2) $2 \text{CaO} + 2 \text{SiO}_2 = 2 \text{CaSiO}_3$; or
- (3) $2 \text{CaF}_2 + 3 \text{SiO}_2 = 2 \text{CaSiO}_3 + \text{SiF}_4$.
- (4) $2 \text{CaF}_2 + 3 \text{S} = 2 \text{CaS} + \text{SF}_6$.
- (5) $2 \text{CaF}_2 + 3 \text{P} = 2 \text{CaP} + \text{PF}_5$.
- (6) $3 \text{CaCO}_3 + 3 \text{SiO}_2 = 3 \text{CaSiO}_3 + 3 \text{CO}_2$.
- (7) $3 \text{CaCO}_3 + 3 \text{S} = 3 \text{CaS} + 3 \text{CO} + 6 \text{O}$.
- (8) $3 \text{CaCO}_3 + 3 \text{P} = 3 \text{CaP} + 3 \text{CO} + 6 \text{O}$.

It will be seen from equations (1) and (2) that silica combines with calcium fluoride and sets free two molecules of calcium oxide, which will satisfy two additional molecules of silica, the result being that of equation (3). In the case of sulphur and phosphorus there is a direct interchange of constituents. The reactions attending the joint use of fluorspar and limestone would be expressed by combining equations (3) and (6), (4) and (7), (5) and (8).

The volatilization by fluorine, as shown by these reactions, of one-third of the difficultly fusible constituents of slag and the resulting increase in lime content, seem to present the following distinct metallurgical advantages: 1, the slag is more basic, fusible and liquid; 2, fusion is effected at a lower temperature, which, together with the heat yield from the formation of fluorides, reduces fuel consumption; and 3, the concentration of the slag increases the metal output.

Fluorspar has a very limited value, if any, in assisting in the removal of carbon or manganese. An excess of this flux over the quantity required to flux the silica, sulphur and phosphorus, would alloy graphite and manganese with the iron and reduce silica to silicon; and fluorides would be formed which, in the reaction with the hydrogen of the furnace gases, would be reduced to metals and hydrofluoric acid. Such an employment of fluorspar requires very careful manipulation; but it may be made to give, as desired, either pure iron, iron of slightly altered qualities, or a distinct alloy.

Fluorspar with Other Fluxes.

In quantitative effect, fluorspar has a distinct advantage over other basic fluxes—about two to one as compared with calcium carbonate, the cheapest of them. Moreover, by reason of the volatilization of one-third of the impurities, it forms only two-thirds as much slag as limestone. But it costs eight or ten times as much as limestone; and large quantities of it would produce effects opposite to those desired. Hence the best present practice is to use as a flux in iron and steel metallurgy a comparatively large proportion of limestone and a small proportion of fluorspar (in order to secure the peculiar effects of the latter). This practice is not very expensive. For example, if limestone costs 50 cents and fluorspar \$5 per ton, the use of 3 per cent. of fluorspar in the flux would make the cost per ton of flux 63.5 cents,

instead of 50 cents, or only 9 per cent. of increase in the cost of the flux for each 1 per cent. of fluorspar.

The substitution of other basic fluxes for part of the limestone will not interfere with the action of the fluorspar; but some of them, like dolomite, require a greater percentage of fluorspar to lower their melting point.

The net fluxing value of a crude fluorspar may be determined with sufficient accuracy by deducting the silica plus 2 units of basic impurities or 1 unit of calcium fluoride for each unit of silica. Thus, in a material containing 91 per cent. of calcium fluoride, 2 of silica and 7 of calcium carbonate, alumina, iron oxides, &c., the 2 units of silica could be regarded as practically neutralized by 4 units of the basic fluxes, leaving as the net flux 91 of calcium fluoride and 3 of basic compounds; whereas, if the material contained 91 calcium fluoride and 9 silica, it would be necessary to deduct 9 units of the fluoride to satisfy the silica, leaving as net flux 82 per cent. of calcium fluoride.

Analysis and Grades.

The standard methods for the analysis of fluorspar, as described and discussed by Brush, Penfield, Richards and others, need not be stated here, since they are easily accessible to students. But I may call attention to a method proposed by Randolph Bolling† as sufficiently accurate and rapidly for use in open hearth steel works using fluorspar as a flux. Such practical methods are useful not only for determining the available proportion of flux, as a guide to the smelter, but also as a check on the sellers of the crude spar.

Fluorspar is commercially obtainable in four grades. Stated in percentage, the first carries from 96 to 98 calcium fluoride, with not more than 2 silica; the second, 90 fluoride, with less than 4 silica; the third, 80 fluoride, with a maximum of 12 silica; and the fourth, about 60 fluoride, with a maximum of 15 silica. Concerning these grades, it may be added that the first, by reason of its cost, is little used in iron and steel works; the second is the most available for that purpose, though in some cases it might be economical to require (and pay for) a material considerably lower in silica than 4 per cent. The third is likely to give (after due allowance for the basic constituents) about 78 per cent., and the fourth a minimum of 60 fluoride with 10 per cent. of available basic flux. The economic limit for the purchaser is about 8 per cent. of silica; and the third and fourth grades should be purchased only on the basis of their net fluxing value, as determined by the method suggested above.

The proportion of fluorspar which can be used with advantage is thus seen to be a variable, dependent upon the price of the crude material, the process in which it is employed, and the impurities of flux, fuel and ore. The calculations of the furnace manager should be made accordingly. It may be said, however, that where pure limestone is the main flux, from 1.5 to 8 (on the average, 3) of fluorspar to 100 of limestone is sufficient to secure the main advantages of the compound flux; for magnesian limestone from 15 to 30 per cent. of the fluoride may be required.

The fluorspar limestone flux may be useful in the manufacture of pig iron, wrought iron, crucible steel, basic Bessemer and open hearth steel, iron and steel alloys, and ordinary and malleable iron castings. In rare instances, and in small quantities, it may be serviceable in the acid steel processes also.

Blast Furnace Use.

In blast furnace practice, it has been as yet but little used, for the reason that its advantages are not generally understood, and its cost has been regarded as prohibitory. As has been shown above, however, the additional expense of using a certain percentage of fluorspar is not great in comparison with the economic and technical benefit thus secured; and its use may, therefore, reasonably be expected to increase. It is specially advantageous in the smelting of highly siliceous ores, and for the purpose of "thinning" a too limy slag, for which it is used by the Illinois Steel Company. It may be blown as a powder through the tuyeres or intimately mixed with the charge.

It should be of service in smelting iron ores in the

* From a paper read at the New Haven meeting of the American Institute of Mining Engineers, February, 1909.

† *The Iron Age*, Vol. LXXVIII, No. 19, page 1258 (November 8, 1906).

electric furnace, since it lowers the temperature of fusion. It is known to be serviceable for this purpose in other electric furnace operations, as in the Lungwitz zinc process, in making alundum, carbolite, &c.

In the Bessemer process, because of the strongly oxidizing conditions, fluorspar is little used. But even here, it appears, according to Howe, to assist, by melting the lime rapidly, in making an effectively basic slag, with which phosphorus combines readily during the early part of the operation.

In the Basic Open Hearth Furnace.

It is in the basic open hearth process that American fluorspar is mostly used, especially in plants which produce steel for rails, tubing or castings, for which the highest quality of open hearth steel is required. In this process fluorspar is used to facilitate the liquefaction or thinning of the slag (especially to help melt the flux or limestone), thus reducing by about half the time required for the melt. It is only to be used when the limestone is soft and white hot, floating at the top of the bath, usually about two hours prior to the completion of the heat. If used sooner, it makes the slag too thin. If too much limestone is charged, fluorspar is helpful in converting it to slag quickly. An excess of fluorspar thins the slag too much, with harmful results, such as the rapid oxidation of the carbon, which reduces the temperature; the excessive oxidation of iron, which causes losses of metal and also thins the slag; and the too rapid oxidation of other impurities (such as phosphorus and sulphur), which gives them opportunity to become again reduced and alloyed with the metal. Phosphorus is more readily oxidized than sulphur and also more returns earlier to the metal.

The percentage of fluorspar to that of limestone in this process varies from zero to 8 per cent., with 3 per cent. as an average. Where the slag is sufficiently thin, or if sufficient scale (iron oxide) has been used no fluorspar at all may be required. If the slag is thick and melts slowly, a little fluorspar is shoveled in. An intelligent furnaceman requires less fluorspar than a careless one. The requirement of fluorspar per furnace is about 100 tons per year. "Gravel" fluorspar is used, usually of the second grade.

The procedure in open hearth practice, according to a private communication from J. W. L. Kerr, is as follows: Magnesite and dolomite are first put in as furnace lining. Afterward 6.5 tons of limestone and 25 to 35 tons of scrap iron are put in and heated together. At the right heat, the melted pig iron necessary to make the total charge 60 to 70 tons is added. Lake Superior hematite is then added until the carbon is reduced from 0.18 to 0.08 per cent. Pieces of limestone come to the surface in blocks; and fluorspar is used in amounts varying from 200 to 1100 lb., or about 0.15 to 0.8 per cent. per charge, both to break up the limestone blocks and to reduce sulphur and phosphorus.

At the Illinois Steel Company's South Chicago works the practice, according to a private communication from George L. Danforth, Jr., is to use from 0 to 15 lb. of fluorspar (6 lb. on the average) to 200 lb. of limestone per ton of basic open hearth steel produced, the iron charged being half pig, half scrap. No actual weights are taken, and the gravel fluorspar is shoveled in as needed when the limestone is at the right heat.

Where 50 tons of cheap scrap iron are used, the use of 2.5 per cent. of fluorspar is said to give as fine steel as the best pig produces.

Carr proposes the addition of 13 lb. of fluorspar with 300 lb. of limestone to 1227 lb. of pig iron and steel scrap for each ton of basic open hearth cast steel produced.

Fluorspar is a valuable flux in the preparation of iron and steel alloys, and here its value depends on its use in excess in conjunction with a highly basic flux in reducing carbon, manganese, silicon, chromium, nickel, &c., as previously explained. In the ordinary blast furnace ferrosilicon containing as much as 10 per cent. of silicon can be produced from any siliceous ore in this manner. Likewise spiegeleisen, low or high ferromanganese, or metallic manganese may be produced. In the last case the flux consists of alumina, lime and fluorspar.

In the Iron Foundry Cupola.

The objections that have arisen in some quarters to the use of fluorspar in foundry practice are due to the ignorance of its capabilities and manner of use. The dealers who sell fluorspar as a flux under high sounding names, making extravagant claims as to its effect in extremely small quantity, and charging correspondingly high prices for it, are chiefly to blame for this. That its use alone has proved unsatisfactory is not surprising. When it has been used in conjunction with limestone the failures have been due to an insufficient amount of total flux, usually with the additional error of an improper proportion of fluorspar and limestone in the mixture. This explains the unsatisfactory results of the foundryman's laboratory tests, reported by N. W. Shed, in which it was sought to reduce sulphur and phosphorus without making allowance for either the fluorspar or the limestone which would necessarily flux part of the silica of both the coke and the pig iron—a neutralization which left no fluorspar available to reduce the sulphur or the phosphorus.

The present foundry practice is to use pure limestone (calcium carbonate) for flux in the cupola, 100 lb. of limestone to a 2-ton charge, and either no fluorspar at all or only such small quantities of it as are necessary to help bring about a quick melt of the limestone. If no pure limestone is available, then dolomite is used, and in conjunction with this fluorspar is indispensable. In many foundries, especially in the small ones, only a single 2-hr. heat is made per day, so that the time consumed is immaterial. In the large foundries continuous heats are demanded, with an output of at least 15 tons per hour. The use of fluorspar reduces the length of time required for each melt. Where fluorspar is used with dolomite, only one-half as much time is required as for dolomite without fluorspar. The type of cupola used makes little difference. A typical practice in this respect is that of the Crane Company, Chicago, which, after repeated attempts to get pure limestone for flux, settled upon the use of fluorspar and dolomite in the ratio of 25 or 30 per cent. of fluorspar to 100 per cent. of dolomite. For example, a 2-ton charge, consisting of pig iron and scrap, with sand covered gates, would require 25 lb. of fluorspar and 85 lb. of dolomite for flux, the two being mixed together and shoveled into the cupola. Analyses of typical fluorspar and dolomite used are as follows:

	Fe ₂ O ₃ +						ZnS and	
	SiO ₂	P.	Al ₂ O ₃	CaF ₂	CaCO ₃	MgCO ₃	PbS.	ZnCO ₃
Fluorspar...	1.37	0.006	0.50	96.75	...	...	0.08	1.69
Dolomite...	1.08	0.007	0.68	...	53.50	45.19	...	...

Such fluorspar has 94 per cent. of available calcium fluoride, for some fluorspar is necessary to flux the lead and zinc as well as the silica. A fluorspar is specified for this use that contains less than 2 per cent. of silica, and the dolomite must not contain a greater amount. This means that only No. 1 fluorspar can be used. Lump is purchased, as it is likely to contain less silica. After the fluorspar reaches the foundry it is broken into pieces not larger than the size of an egg, since larger pieces would be likely to strike the lining and, combining with it, destroy it. The cupolas have the usual firebrick linings, which, if the precaution is observed, are but slightly if at all affected. The sulphur is not likely to be reduced materially by the use of fluorspar if there be less than 1 per cent., but if there be more the reduction of sulphur will be marked.

Aside from its use in the cupola, a small percentage of ground fluorspar, placed at the bottom of the ladle, serves to slag impurities, which rise to the surface as a heavy mass, and, after stirring to insure perfect mixture, are skimmed off. According to R. C. Hills, gray iron so treated produced not only a softer iron, but when molded into bars and broken on a testing machine, showed 11 per cent. greater breaking strain than bars made from the same pig not so treated. For malleable iron similar treatment showed a more malleable iron with an increased tensile strength (55,000 to 60,000 lb.), and an increase in elongation (4 to 5 per cent.) over ordinary malleable iron. Frogs made out of this material cracked to a far smaller extent than ordinarily.

Increasing Use.

The use of fluorspar in the iron and steel industry is extending. At present the percentage of fluorspar consumed is one-half of 1 per cent. of the quantity of limestone flux used in America; but there has been a small but steady increase in its use during recent years. This is chiefly due to the extension of the basic open hearth steel manufacture. Fully 80 per cent. of the American fluorspar is consumed in basic open hearth plants. Of this quantity, more than 90 per cent. is in the "gravel" form. About 5 per cent. of the total American fluorspar consumption is used by other branches of the iron and steel industry, chiefly in the manufacture of car wheels and malleable and ordinary iron castings. For the first purpose lump is chiefly used; for the last two, either gravel or ground fluorspar.

Out of some 800 iron and steel plants, only about 65 are known to use fluorspar, chief among the users being all the larger and more important of the basic open hearth plants. Out of hundreds of foundries, only some 150 have used fluorspar. With the assured practically inexhaustible supplies of Kentucky fluorspar, accessible for transportation by rail and water to the large iron and steel centers, it is believed that its use could be generally extended in the iron and steel industry within the limits herein set forth, without material decrease in costs, and frequently with material improvement of products.

The Red E Tool Holders.

In the new line of tool holders known as the Red E and made by the Ready Tool Company, New Haven, Conn., all of the cutters except those for thread cutting are made from shapes readily procured on the market, and for their sharpening require grinding only on one face. The clearance on the side and front are provided

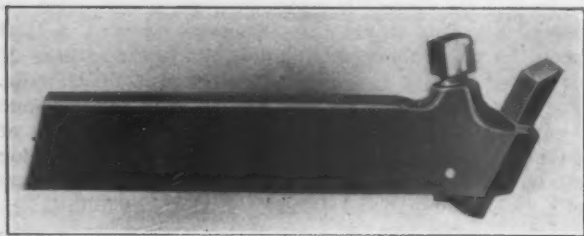


Fig. 1.—Diamond Point Tool.

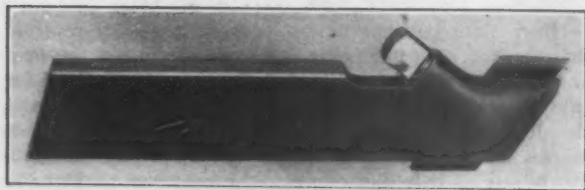


Fig. 2.—Right-Hand Side Tool.

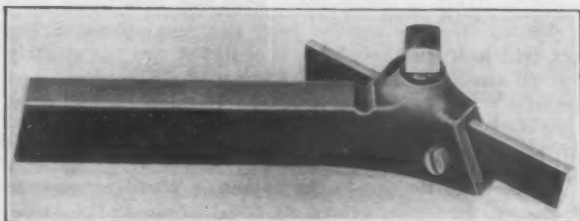


Fig. 3.—Offset Cutting-Off Tool.

Red E Tool Holders Made by the Ready Tool Company, New Haven, Conn.

in the angle at which the cutter is held in the holder, and no grinding is necessary to obtain or maintain it. In common with other makes of tool holders, the Red E holders save waste of tool steel and the labor of forging, as the holder is practically everlasting and the cutter is the only part that has to be renewed. The holders are made in the following styles: diamond point tool, right

and left hand and right hand offset side tools, straight and right hand offset cutting-off tools, and straight and right hand offset threading tools. These are all made in two sizes, one set with holders $\frac{1}{2} \times 1 \times 6$ in. and the other with holders $\frac{5}{8} \times 1\frac{1}{4} \times 7$ in.

In Fig. 1 is shown the diamond point tool, which is made either right or left hand by giving the cutter a quarter turn in the holder. The cutter is held in the holder by a wedge beneath the set screw, making it impossible for the cutter to slip when in use. The wedge, which is held in place by a small steel wire pin, exerts a continuous downward pressure, bearing upon the full length of the tool within the holder.

The side tool holder, right hand pattern, is shown in Fig. 2. In the left hand pattern the slot is inclined toward the opposite side and the cutter is turned side for side. The right hand offset side tool has a bend in the shank just back of the cutter, giving the offset somewhat as in the right hand offset cutting-off tool holder, Fig. 3. The latter in its straight pattern is inserted in a slot extending directly back into the body of the holder, which is, of course, straight and not bent. The blades in both of these holders have equal clearance on both sides. As there are no clamps, nuts or other protuberances on the side of the holder, the cutter may be brought close to the tool post, giving it rigid support, which is so important in a cutting-off tool. Any cutter up to 3-16 in. thickness may be used if desired.

The threading tools, not illustrated, are made in straight and right hand offset patterns. The cutter is supported in these holders very much as in the diamond point tool holder, but in this case is of special form; the back and sides are square and the front V-shaped, corresponding to the form of a thread groove. The back of the cutter has teeth cut in its surface and is engaged by a block acted upon by the set screw which takes a position as in the side tool, Fig. 2. The Red E threading tool is one of the few on the market which comes within the dimensions of a forged tool.

All of the tool holders are steel castings, case hardened; the set screws are of tool steel, hardened, and the cutters of high speed steel. With each holder is included a wrench and one cutter ground ready for use.

The Zimmerman Steel Company's Improvements.—

The Zimmerman Steel Company, Lone Tree, Iowa, is making extensive improvements in its foundry and steel plant. A new building, 72 x 115 ft., of steel and concrete construction, will be erected which will be equipped as a modern steel and gray iron foundry. In it will be installed a 15-ton cupola for gray iron castings, another cupola for steel castings and a steel converter. The converter will have a capacity of 20 to 30 tons of steel a day and is of an improved type, designed and built by the company, which has had one in constant operation since last October. The steel made by this process is said to be of high quality, will run true to pattern and can be hammered, welded and twisted. The main molding floor will be 36 x 112 ft., covered by a 12-ton electric traveling crane, and two smaller floors will be 17 x 112 ft. each. A laboratory will be added, supplied with modern equipment to make complete chemical and mechanical tests. The machinery will be operated by electricity and compressed air. The Zimmerman Steel Company started the manufacture of stump pullers about 16 years ago in a building 14 x 16 ft. From time to time the plant was enlarged to meet the demand for the products, and now with the new addition completed it will cover several acres of ground. Plans for the improvements to the plant contemplate a rearrangement which will enable the company to manufacture its All Genuine steel stump pullers, semi-steel stump pullers and two different styles of wagon scales at the lowest possible cost. Last year the company shipped its steel stump pullers to 23 different foreign countries.

The Rhode Island Branch, National Metal Trades Association, will have an outing June 17, when the Boston Branch and other New England members will be present.

Judicial Decisions of Interest to the Iron Trade.

BY A. L. H. STREET.

Sales—Contract Construed.—A provision, in a contract for the sale of certain machinery, that the price, which was deposited with a third person, was to become the property of the seller when the machinery had been delivered in the condition set out in the contract, "and to the acceptance of said" purchaser, and that until the purchaser "shall have received and accepted" it, the sum specified was to remain the property of the purchaser, the refusal of the purchaser to accept terminated the contract, unless his decision not to accept was made in bad faith. (Indiana Appellate Court, *Holtz vs. Gaidry*, 87 N. E. Rep. 997.)

Sales—Heating Plants.—Where, in an action for breach of warranty of a heating plant installed by defendant in plaintiff's residence at a cost of \$250, there was evidence that the plant, if constructed as warranted, would have been worth at least \$400, and that as it was constructed it was worth from \$150 to \$175, and one witness testified that the plant as constructed was worthless, a verdict for \$350, reduced by the court to \$275, was supported by the evidence. A contract for the installation of a heating plant in a residence, stipulating that the boiler and radiators shall be of sufficient capacity to heat the building, requires the installation of a boiler and radiators which, when constructed and joined together, will produce the results promised; "radiation" referring to the heating capacity of the radiators when connected with the boiler. (Iowa Supreme Court, *Cooper vs. Scott Company*, 120 N. W. Rep. 631.)

Notes—Payment—Place for Presentation.—Under the provision of the negotiable instruments law, which requires a note to be presented for payment at the place of payment specified therein, where a note was payable at the "Jenkins Trust Company, Bath Beach Branch, Brooklyn," presentation at the principal office of the company on the date of maturity and at the specified branch after banking hours the next day was insufficient as against an indorser. (New York Supreme Court, Appellate Division, *Ironclad Mfg. Company vs. Sackin*, 114 N. Y. Supp. 42.)

Sales—Contracts—Breach—Damages.—Persons suing for breach of a contract to buy pig iron could not show business dealings between them and the buyer's predecessor after the suit was discontinued as to the predecessor. The buyer's repudiation of the contract could be shown by her delay in paying debts connected with the business, and by letters of her manager from which it could be inferred that the business had proved unprofitable, and that she was contemplating an early sale of the plant, while delaying acceptance of the iron. Such evidence of an intent to repudiate the contract was not weakened by her attorney's offer to perform the contract in reply to the sellers' demand for a settlement. The contract for the sale having been entire and not severable, the buyer having repudiated it, and no part of the purchase price having been paid, the sellers could recover the difference between the market price of the entire amount when the contract was repudiated and the contract price, notwithstanding the iron was to be delivered in installments and payment was due 30 days after the arrival of each car. (Massachusetts Supreme Judicial Court, *Moffat vs. Davitt*, 86 N. E. Rep. 929.)

Sales—Breach of Contract—Damages.—A party to an unperformed contract of sale can stop performance when for any reason he deems it to his interest to terminate the contract, subject to the obligation to pay damages to the other party and such other party cannot proceed thereafter with performance in order to enhance his damages. When one who has agreed to buy goods prevents performance of the seller's contract, the seller can recover money expended and the value of labor bestowed in partial performance, in addition to the profit he would have received on full performance. Where one broke an agreement to buy a refrigerator which was of a standard make and not specially manufactured for him, the seller's right to recover was limited to the difference between the contract price and the market value. The seller could not recover the contract price, if the buyer canceled the order before the refrigerator was shipped unless the cancellation was afterward countermanded. (Kansas City, Mo., Court of Appeals, *Frederick vs. Willoughby*, 116 S. W. Rep. 1109.)

Employees—Personal Injury.—Defendant contracted to replace 8 ft. sq. section of a horizontal smoke flue, which was 8 x 10 ft. where it connected with a vertical flue. Plaintiff, a workman, fell into the vertical flue and was injured while walking through the larger sections, which were unlighted. Held that defendant is not liable for the injury under the rule requiring employers to provide workmen safe places of work, since he was not bound to anticipate injury to workmen in a part of the flue to which his contract did not relate. An employer's duty to inspect and guard or light dangerous places is merely incidental to the duty to furnish a safe place in which to work. Since an employer is liable for his superintendent's negligence only when it relates to

some duty of the employer, such as to furnish a safe place of work, &c., defendant is not responsible for plaintiff's injury because the foreman ordered plaintiff to go into the larger section of the flue to procure some planks, notwithstanding the foreman might have foreseen the injury. (New York Supreme Court, Appellate Division, *Farley vs. Robert White Engineering Company*, 115 N. Y. Supp. 635.)

Employees—Suit for Injury.—A complaint in a suit against a steel and iron company, alleging that the company operated a coal mine and that plaintiff while in the company's employ and while riding on a tramcar of the company was injured through the cable breaking, was not objectionable as failing to show that the injury was received in the line of his employment. (Alabama Supreme Court, *Sloss-Sheffield Steel & Iron Company vs. Chamblee*, 48 So. Rep. 664.)

Employees—Suit for Injury.—In constructing the iron work of a building the rope used in hoisting beams was permitted to come in contact with a sill of the lower deck of the traveler on which two derricks were placed, causing the traveler to shake as a load was being raised. While a column was being raised, the dog on the drum of one of the derricks slipped, causing the boom to fall and the derrick to be precipitated into the cellar. About 5 min. later the foreman ordered decedent, an experienced structural steel worker, and another employee to go up to see if the other derrick was all right. As decedent walked over planks resting on beams on the upper deck of the traveler one of the planks gave way owing to the fact that one of the beams had shifted, leaving the plank unsupported, and decedent fell, resulting in his death. Held that the foreman was not negligent, so as to make the employer liable for the death, because he failed to ascertain the condition of the upper deck before sending decedent there, since, if the situation was rendered dangerous by the derrick falling, the foreman could assume that decedent would appreciate the danger. Even if it was careless to permit the rope to drag over the sill and such carelessness caused the derrick to fall, the displacement of the beam on the upper deck could not have been reasonably apprehended so as to make the negligence the direct cause of the injury, notwithstanding the fact that the planks were not nailed to the beam. (New York Supreme Court, Appellate Division, *De Bock vs. American Bridge Company*, 115 N. Y. Supp. 461.)

Employees—Suit for Injury.—Decedent, with other employees, was engaged in erecting a derrick. After the mast had been set up and one of the supporting timbers was attached to it, decedent was raised to the top of the mast to attach the other timber, when the whole structure was knocked over by the second timber which was being raised. The timber broke in three pieces, one of which struck and killed decedent. Held that any rottenness of the broken timber was not the proximate cause of the death, since the result might have been the same had it been sound; and that if accident was due to decedent's own or his fellow employees' negligence or was unavoidable, the employer is not liable. One suing an employer for death of an employee must show that the negligence complained of was the proximate cause of the accident resulting in the death, and that fact must be established by evidence and not by conjecture. (New York Supreme Court, Appellate Division, *McDonnell vs. Metropolitan Bridge & Construction Company*, 115 N. Y. Supp. 865.)

Some excellent records have been made in the 25-ton open hearth furnace designed and constructed by the Pittsburgh Furnace Construction Company, Pittsburgh, for the Erie Forge Company, Erie, Pa. The furnace was dried without any auxiliary fire at the bottom of the stack, and the draft was started as soon as the wood was lighted in the furnace, which is unusual. Magnesite bottom was made in less than 48 hr., usually taking from four to eight days, and the first batch of steel was melted down in about 2½ hr., and the second heat was drawn in less than 7 hr. It is stated that the furnace was run on 19 gal. of oil per hour, which makes the fuel cost per ton of steel made about 15 cents.

The Damascus Crucible Steel Casting Company, New Brighton, Pa., lately completed a new 3-ton open hearth furnace, and is making other improvements which will enable it to produce a line of high quality tool steel, for lathe, planer and shaper tools. The members of the company are old tool steel manufacturers, which influenced it to add this line to its present casting business. The new department is being equipped with a Morgan Engineering Company's 1100-lb. steam hammer, a 40-hp. Nagle boiler and an additional heating furnace, making a total of three, and which will be ready for operation about July 8.

The Girod Electric Steel Furnace.*

BY PAUL GIROD,†

The working portion, or hearth, of the Paul Girod electric furnace consists of a circular or oblong chamber, which when working is filled with molten metal to a depth of 12 to 14 in. One or more electrodes, of like polarity, are suitably suspended above the bath; the other pole or terminal consists of a number of pieces of soft steel buried in the refractory material of the hearth at its periphery, the upper ends of which come into contact with the metallic bath. The circuit thus established, the electric current forms an arc between the upper electrode and the surface of the bath, through which it passes to the connecting pieces of soft steel to the other terminal of the furnace.

The upper portions of these connecting pieces directly in contact with the metallic bath naturally fuse to a certain depth, which does not, however, exceed 2 to 4 in., as has been demonstrated by sections made of these pieces after several months' use. In order to decrease the depth of the fused portion as much as possible, and to assist in preserving the lower portion of the refractory lining of the furnace, the lower extremities of the connecting pieces are fitted with a water cooling arrangement, in a cavity about 6 in. deep, in that portion of the steel connectors projecting outside of the furnace; this also serves for connecting the cable to this terminal.

According to the capacity of the furnace, one or more electrodes are used above the bath, but if more than one is used they are always in parallel, connected to the same terminal of the generator or transformer, the other terminal being connected to the metallic connecting pieces. The furnace may be run with either continuous or alternating current, but in the latter case it is necessary to take into account that cost will be about 0.88.

The furnace body consists of a metallic shell made of plate steel, forming a chamber round, square or rectangular, as may be desired, lined with suitable refractory material (magnesite or dolomite). The furnace is supplied with suitable charging and working doors and a tap hole. The steel is tapped by tilting the furnace, for which purpose it may be mounted upon trunnions or rollers. A cover lined with silica brick is mounted over the furnace, the ports for the electrodes being fitted with a removable cast iron water cooled frame. The electrodes are so fitted that air cannot enter the furnace, this and the use of metallic frames or collars being possible by the fact that the electrodes have the same polarity, and there is, therefore, no danger of short circuits across the cover. The use of the metallic frames for the electrode posts is not altogether necessary, but has the advantage of more perfectly closing the furnace and stiffening the cover.

Advantages of the Girod Furnace.

The Girod Furnace may be classified in the category of arc furnaces, but it works also partially by resistance, due to the passing of the current through the metallic bath. This resistance feature becomes of prime importance in starting up a furnace with a charge of cold scrap, turnings or cast iron. The current passes through this mass of distinct particles, so that almost the entire potential difference between the terminals of the furnace is absorbed by the high resistance of the charge, a great number of small arcs being formed between neighboring pieces. The heating and melting begins, therefore, throughout the entire mass of the charge simultaneously.

The great ease with which the furnace may be started up with cold charges is a marked advantage over other systems. The method of arranging the electric circuit permits of easy automatic regulation of the arc, as there is but one drop of potential to be regulated in the circuit, instead of two successive drops, as is the case in furnaces having two electrodes in series. Like all arc furnaces, the Girod furnace lends itself extremely well

to the work of refining the metal; it permits of obtaining very hot and fluid slags, which may be entirely removed during the handling of a charge. The low voltage at which the furnace works (about 55 volts) makes it very easy to thoroughly insulate all parts of the furnace circuit, or any places where short circuits might occur; this is an additional safeguard for workmen who may by reason of their duties or accidentally come in contact with the current.

The Manufacture of Steel.

The following data have been taken from Girod furnaces in actual operation at Uginé, in the works of the Compagnie des Forges et Acieries Electriques Paul Girod. One of these furnaces has now been working for several years and has never given the slightest trouble which could be ascribed to its particular form or design.

The raw materials at Uginé consist of scrap, turnings and some cast iron, gathered indiscriminately in the market. The problem, therefore, is to refine these materials, charged cold, to obtain a high grade steel; the furnaces at Uginé should, therefore, be classified as in the class for the "production of steel from scrap materials when charged cold into the furnace."

The average analysis of raw materials charged is as follows: Carbon, 0.4 to 0.5; silicon, 0.15 to 0.25; manganese, 0.5 to 0.7; sulphur, 0.06 to 0.09, and phosphorus, 0.08 to 0.1. The finished steels are of any desired grade of all degrees of hardness, carbon and special structural steels, tool steels, cast steels, &c.

The characteristics of electric furnace steels are their high elastic limit and their great resistance to shock, compared with Bessemer, open hearth or crucible steels. These qualities seem due to the chemical purity of electric furnace steel, to its homogeneity and freedom from occluded gases. The two latter points are of greater importance, inasmuch as the sulphur and phosphorus content hardly ever exceeds 0.03 per cent.

Data as to Costs of Melting.

The factors which enter into the cost of manufacture of steel in the Girod furnace are generally as follows, in the alternative of working with cold charges, with or without refining, or with molten charge. The figures refer to the ton of steel produced:

I. TREATMENT OF A CHARGE OF COLD SCRAP, WITH REFINING.

a. *Energy Consumption.*—The average energy consumption for fusing, refining and finishing a charge of cold scrap is 900 kw.hr. in a 2-ton furnace and 700 kw.hr. in a furnace holding 8 to 12 tons, the energy being measured at the furnace terminals. These figures will, of course, be slightly increased in the case of special steels, or diminished as the refining period is shortened.

b. *Electrode Consumption.*—The electrode consumption is about 16 to 18 kg. (35 to 40 lb.) in a 2-ton furnace and 13 to 15 kg. (29 to 33 lb.) in an 8 to 12 ton furnace per ton of steel produced. The unused portions of the electrodes, corresponding in length to the height of the arched cover above the bath, are included as having been actually consumed. The consumption of electrodes will obviously depend upon their quality. That indicated above refers to ordinary amorphous carbon electrodes made from retort carbon, and not graphitized electrodes.

c. *Lining.*—The lining is of brick (or, better still, a paste), made of magnesite or dolomite. These materials give equally good results, and, therefore, the one is used which can be had at the lowest price. In France dolomite is generally used, as the price is very much lower than magnesite. One such lining will last 40 to 50 heats without any repairs, after which the lateral walls of the furnace receive partial repairs. Now and then, generally after 100 heats, the upper portion of the hearth lining for a distance of about 10 cm. (4 in.) is repaired also. After having scraped and cleaned the hearth, magnesite or dolomite is rammed in for a height of about 10 cm., taking care to preserve the passage for the metallic contact pieces. The hearth otherwise does not require any other repairs than fixing up the sides for the distance of 10 cm. Thus, in the oldest furnace in use at Uginé the same hearth has been in place for over two years without having necessitated repairs. The

* A paper read at the Niagara Falls meeting of the American Electrochemical Society.

† Managing director of the Société Anonyme Electrometallurgique, Procédes Paul Girod, Uginé, France.

cover is of silica or high grade firebrick, the life depending upon the quality of the brick. With good material a cover will last through 40 to 50 heats. Under these conditions, in France, the expense for furnace linings will be 7 to 8 francs (\$1.40 to \$1.60) per ton of steel produced in a small furnace, and 4 to 5 francs (\$0.80 to \$1) in a large furnace of 8 to 12 tons capacity.

d. Labor.—To handle the furnace three men are sufficient—a melter, an assistant melter and a boy for a small furnace; four men for a large furnace. At Ugine the large furnaces are charged by an electric charging machine.

e. Additions.—To the expenses above mentioned should be added the sundry additions, such as lime, ore and fluorspar, for the various slags, on one hand; and ferro-alloys, ferromanganese, ferrosilicon, silicomanganese, &c., added during the final period and finishing of the metal, on the other hand. The total of these items will vary essentially with the purity of the prime materials used, and with the quality of the steel to be made; it varies between 3 and 7 francs (\$0.60 to \$1.40) the ton.

f. Losses.—The loss in the furnace will depend mostly upon the composition and state of oxidation of the scrap and materials charged; with heavy scrap, but little oxidized, the loss is from 6 to 7 per cent.

II.—TREATMENT OF A CHARGE OF COLD SCRAP WITHOUT REFINING.

This is the case where one simply melts in the electric furnace a charge of selected and sufficiently pure materials. The time of the heat is diminished by 25 per cent., so that the various expenses of melting, as above, are reduced to about 75 per cent. of their value in Case I.

III.—TREATMENT OF A CHARGE OF LIQUID STEEL.

The molten steel can be taken from a Bessemer converter or from an open hearth furnace. The time of the heat is then reduced to 20 to 30 per cent. of the length of a heat of material charged cold and refined (Case I). The various factors entering into the cost are brought to 20 to 30 per cent. of the value indicated in Case I. The energy consumption, the carbon consumption and repair costs of the furnace are very much reduced by the fact that the furnace is kept constantly hot, there being no important drops in temperature as in the case of cold charging, a condition unfavorable both from the point of view of energy consumption and preservation of linings. These results are drawn particularly from the working of a 3-ton Girod furnace which has been running since February, 1900, at the steel works of the John Cockerill Company, at Seraing, Belgium, which is supplied with hot metal from a Thomas or basic Bessemer converter.

New Publications.

Social Engineering. By Dr. William H. Tolman. Pages, 394; 57 illustrations. McGraw Publishing Company, New York. Price, \$2.

Through the department of economics and sociology of the Carnegie Institution, Dr. Tolman, who is director of the Museum of Safety and Sanitation, has prepared the work before us on social engineering, to which he has given many years of study and of personal sacrifices. By way of introductory, there is printed a characteristic letter from Mr. Carnegie, who states that "It is by the efforts of individual firms that the right solution of the problem will be furnished, and not through socialism, which can only talk speculatively, which individuals can work practically, curing evils that socialists point out." Mr. Carnegie, himself a pronounced individualist, believes that it is through the voluntary action of leaders of industry that betterment must come. It is not through legislation, only too often pressed by sentimentalists and framed by demagogues, who find it soothing to their vanity or profitable to spend other people's money in doing good to men and women quite capable of taking care of themselves.

Enlightened selfishness of employers has been mainly instrumental in bringing about the great improvement

which has taken place in industrial conditions during the past 30 years, and it is that upon which reliance must be placed in the future. Still, the fact must be faced that public opinion is more deeply impressed with what has not yet been done than with past accomplishments, and manufacturers must deal with the dangerous impatience of the professional reformer and the virtuous indignation of impracticable idealists.

We observe with satisfaction that Dr. Tolman, in reviewing the efforts made, takes up first the subject of Efficiency Promotion. In this first as in subsequent chapters he cites innumerable examples gathered with great industry and presented with rare discrimination. He follows it with a review of the many proposals to improve hygienic conditions and of safeguarding life, limb and health. He discusses under the general title of "Mutuality" the various organizations which have for their object the provision of weekly payments in case of sickness or accidents and the payment of death benefits. Closely connected with them are the schemes for encouraging thrift. In a chapter on profit sharing a number of methods are described. The question of housing, in which so much progress has been made, is discussed, and chapters are given on recreation. In dealing with the more comprehensive plans connected with isolated factory communities, Dr. Tolman refers to Peacedale of the Hazards, Elmwood of the Gorham Company, the community of the Solvay Process Company, Vandergrift, founded by George G. McMurtry, Gary of the Indiana Steel Company, Sparrow's Point of the Maryland Steel Company, Hopedale of the Draper Company and Kinkora of the Roebblings. In the final chapter, "Does It Pay?" Dr. Tolman quotes Carroll D. Wright and others. The evidence is not overwhelming in volume, nor is it convincing, but it is quite clear that it requires an unusual amount of good common sense and of tact to make efforts for the improvement of industrial conditions successful.

Huette—Des Ingenieurs Taschenbuch. Three Volumes. Issued by the Akademischer Verein Huette. Published by Wilhelm Ernst & Sohn, Berlin.

Over 50 years ago a small group of engineering students at Berlin, chiefly identified with the metallurgical courses, collected and circulated drawings of furnaces and other data. This was expanded by the society to an engineer's pocket book, and has steadily grown in scope and in volume until the latest publication consists of three volumes aggregating about 3000 pages, supplemented now by a separate pocket book for iron and steel makers, which is to be issued in the fall. The Board of Editors consists largely of eminent professors at different technical colleges, but includes also the managers of great German works like Siemens-Schuckert, Egestorff and Flohr. The first volume deals with mathematics, mechanics, the strength of materials and the elements of machinery. The second goes into power machinery, machine tools, cranes, blowers and compressors, into marine architecture, railroad rolling stock and electrical machinery. The third volume is devoted entirely to the wide field of civil engineering, but embraces also heating and ventilation, rope tramways, gas manufacture and the arrangement of factories. It is difficult to convey briefly what an enormous mass of information has been compressed into small space, with a clever use of simple illustrations and diagrams, which admirably bring out the underlying principles. To those familiar with the German language it will prove a precious work of reference.

The Kewanee Water Supply Company, Kewanee, Ill., which has heretofore had its pumping equipment, used in connection with pressure tanks for individual water supply systems, manufactured in outside shops, has built and equipped a new machine shop for turning out its own work. The machinery installed includes a 30-in. Gray planer, a 50-in. Binsse boring mill, a 12 x 42 in. grinder, two 14-ft. and one 18-ft. Lodge & Shipley lathes, a 3½-ft. Bickford radial drill and a No. 1 A Milwaukee miller.

THE IRON AGE

Established in 1855.

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	-	-	-	-	-	HARDWARE EDITOR.

Foundry Association Progress.

The assertion that the foundry trade is awake and making progress finds as general acceptance now as was given but a few years ago to the common criticism that it was backward and clung grimly to its old ways. The convention of the American Foundrymen's Association and allied organizations at Cincinnati last week only strengthened the impression made by the three great gatherings that preceded, that the spirit of enterprise is getting hold of the foundry industry and that good brains are at work on its problems. It looks as though a few men of uncommon ability had appreciated the fact that the foundry field afforded plenty of elbow room and had reaped the advantage secured by early comers in any new country. What has been happening since the Cleveland convention of 1906 is apparently the result of a belated appreciation by hundreds of foundrymen of the position in which they have been left by the advance.

That 2000 men connected with foundries and with industries dependent upon foundry operations came together at the Cincinnati convention is significant enough in itself. Unquestionably the exhibit of mechanical equipment, on which so large an outlay was made, accounts in part for the great outpouring. But it is a mistake to suppose that the technical sessions do not have large interest for many attendants. Commercial considerations make a very strong and direct appeal, and it is true that any exhibit that shows a proprietor or superintendent how he can save money is a first class attraction. Yet it is to be remembered that the excellent work of the American Foundrymen's Association, with the cumulative influence it has exerted, has been the inciting cause. It has marked out the lines of the advance and mechanical invention has met the need.

The Cincinnati meeting emphasized these two things in particular: that foundry proprietors and managers are a much more numerous class of attendants than formerly and that in the papers and discussions prominence is given to the lines on which advances are imminent. No doubt the fact that foundry machinery is demonstrated at the accompanying expositions is bringing in large numbers those who have authority to buy; but such men are also more in evidence on the convention floor. The character of the discussions has changed because of their presence. At Cincinnati the permanent mold and continuous melting were the leading subjects under consideration, while the electric furnace as a possible adjunct of the foundry was not neglected. The

molding machine, having had so large a share of attention in the discussions at Toronto, did not figure prominently this year, but on the exposition floor several exhibits were proof that the year has been one of progress. What the stove foundry has gained in this direction since the Toronto convention is well known. That the permanent mold will become more and more of a factor in repetition work can hardly be doubted, in view of what was brought out by Mr. Custer's paper; yet the day of any considerable detriment to the molding machine on this account is doubtless some distance in the future. Of the rapid extension of continuous melting, which was discussed with such interest at the convention, there is little question.

In brass foundry practice the Cincinnati discussions indicated that economies in melting constitute the most important problem now before the trade. That costs vary widely at present is evident and that, too, in foundries employing the same type of furnace. Since the high temperatures of the electric furnace seem to make it unavailable, the quest for the ideal brass melting apparatus may be expected to come from the development of existing methods of utilizing the oil or gas flame.

The Veto of a Drastic Labor Bill.

Governor Draper of Massachusetts has vetoed a bill sent to him with the approval of the Legislature which would have been one of the most drastic of measures, not only in the state of its inception, but in its influence on the movement toward a shorter day's work. The veto has been sustained. The Governor is himself a large employer of labor as the head of the great Draper Machine Works of Hopedale, and has a keen realization of the merits and demerits of laws restricting the rights of employers and their workmen. This bill would have made it unlawful for any State, county, city or town official, or contractor or subcontractor, to "require or permit" any workman to work more than eight hours in one calendar day; would have imposed a penalty of a fine not exceeding \$1000 or imprisonment for six months, or fine and imprisonment, for each offense; and, most pernicious of all, would have provided that at any trial arising under the provisions of the act evidence that men have worked or are working over eight hours shall be "*prima facie* evidence of the violations of the provisions of this act."

An eight hour law already exists in Massachusetts, applicable to the same classes of employment as prescribed in the bill under discussion, but instead of the present provision that no workman "shall be required or requested to work more than eight hours," the change would have been to "shall be required or permitted," which is a very different matter. The penalty of the law is \$50 fine. Governor Draper in his veto message, referring to the *prima facie* clause, says:

This provision seems to me to be absolutely unjust and improper, if not entirely unconstitutional. This would make the defendant in a cause under this act adjudged *prima facie* guilty before trial, and he would be obliged to prove his innocence rather than compel the complainant to prove him guilty. This to my mind is an unwarrantable change in the common law which would be absolutely unjust to part of our citizens, and could only be defended on the ground that laboring men working for the State or on public works must be protected by law in an entirely different way than other laboring men, who happened to be employed on other classes of work. This would, to my mind, be an unwarranted reflection on their independence and standing, and would also be class legislation of the worst kind.

I further believe that the effect of this law would be to drive much business now done in the Commonwealth of Massachusetts to other States, and, therefore, work a great hardship on manufacturers, contractors and laboring men in

Massachusetts, as it would deprive the manufacturers and contractors of work which they ought to have, and would deprive the men who work for them of an opportunity to get employment on such work. The restrictions of this bill could not be carried out in regard to contractors outside the Commonwealth who are furnishing work for the State, and they would, therefore, have a great advantage in competitive work. I do not believe it is wise to handicap our manufacturers and laboring men with unnecessary restrictions of this kind. As I said earlier, it is not a bill to constitute eight hours a day's work for public employees, but it is a bill for putting unnecessary and unwise restrictions on business and labor of the Commonwealth, and making some men *prima facie* criminals instead of considering them innocent until they are proved guilty.

The disease of labor legislation is "catching"; a law once established constitutes a basis upon which the statutes of other States, as well as Federal laws, are founded. It will readily be seen how dangerous a precedent would be established in the clause making employment beyond the allotted time *prima facie* evidence of guilt. Applied to laws regulating the employment of men and women in manufacturing plants, this provision would result in untold annoyance and trouble, and even privation. There are many workmen who are glad to avail themselves of the opportunity to work long hours when industrial conditions demand it, for they almost always receive extra overtime wages, in open as well as closed shops. For a legislative body to tell men that they shall not be permitted to work, whether or not they wish to do so, no matter what the circumstances may be, so long as it is not an actual emergency, is an absurdity.

Should Machine Tool Prices Be Advanced?

Some of the machine tool dealers are discussing the question of raising prices above the level that has been maintained almost universally for several years, through good times and bad. While there is little possibility of such action at this time, yet it is almost certain that customers will have to pay more for machines in the not very distant future. It is well established that the machine tool trade receives smaller profits than many other industries, including a large percentage of users of machinery. Years ago, when comparatively little competition existed, profits were large, but they gradually dwindled with the increasing keenness of rivalry, until the point was reached when the builders received very small returns on their investment and efforts. Then the trade got together, with the result that the industry placed its competition on a business basis, and there has been no important departure from the carrying out of this principle, even when the extreme dullness of the market proved a sore temptation. Therefore the trade will be in a position to fix its own lists. There is no disposition to establish exorbitant prices, no wish to squeeze the market, but rather the purpose of putting the machinery business where it will net a profit commensurate with that of other industries which have been organized to the extent of business-like methods. The experience of the past 18 months has demonstrated that if profits in an average of years are to yield a fair return from the standpoint of investors in industrial enterprises, the price of the product must be higher. Otherwise there will be a continuance of the reluctance of investors to enter this class of manufacturing, a reluctance that is especially strong in sections where the business has been established for a long time.

It has been argued that the trade cannot afford to set a higher standard of prices because of the effect upon customers. There was little evidence of resentment on the part of buyers when business was good and lists were several times advanced. The complaint was seldom

of price, but of deliveries. It would be better for the buying element of the trade if the machine tool builders made handsome profits and built up large surplus funds, that they might be better prepared to accumulate stocks during dull periods, rather than to have to sail close to the wind in order to weather the storm, as has been necessary in too many instances in the past.

It is pointed out that high prices and large profits would offer an attractiveness which would encourage newcomers in the field. There would doubtless be more of the attempts by men of small capital, present employees of the machinery builders, to start modest shops, a class of competition which is sometimes demoralizing locally because it cuts prices, largely due to the absence of a correct cost system. But in a broad sense this influence is trifling, especially where the manufacturers have the co-operation of the dealers. There is the argument that large buyers, especially manufacturers of other classes of machinery, would enter the machine tool business, actuated partly by resentment, because they consider prices too high, and partly because they see a source of profitable investment. The machine tool trade is a peculiar one. Reputations count for a great deal; the name on a machine is an important influence in selling. It would be a long struggle to establish, for example, a new milling machine business on a large scale. Not only must the line be made known and buyers convinced that it is the equal of machinery of existing makes, but this could only come after a long period of development. The man who would be attracted to the business, especially if he himself were a builder of machinery, would have a realization of the difficulties which must be overcome before he could hope to earn even a small profit, and, in looking ahead, there could be no certainty that prices would always stay up. Many machine tool men believe that prices should advance stiffly with the market, but should recede when the market falls, changes in lists up or down to be made in an orderly manner. As conditions are to-day, the machine tool trade could advance its prices quite materially and still have its average net income much lower than that of many other manufacturers.

Workmen's Compensation and Unemployment.

The Workmen's Compensation act in the amplification of its workings resulting from recent legislation and interpretation, is believed to be a material factor in the unemployment of workmen, concerning which there is much anxiety in the United Kingdom at the present time. Employers and the insurance companies which issue compensation policies are moving toward more exacting physical requirements in employing men, and it is even suggested that a medical examination of applicants for work will be an inevitable result of the burden put upon the employer by the law. With all its beneficent intent the system really is becoming a menace to the employment of large numbers of men who under conditions similar to those in the United States would be assured of a continued opportunity to earn a living at their trades. Doubtless it will prove a strong incentive to the British manufacturer to proceed more rapidly in the adoption of labor saving machinery and in methods which will reduce the number of employees to a minimum.

The Workmen's Compensation Act provides that the owner shall compensate his employees for loss of time resulting from accident, and that in case of death he shall pay an indemnity to their dependents. It does not matter whether the blame for the accident rests with the man or with his employer; the grossest carelessness

on the part of the employee does not relieve the owner. The amount of damages is less for each individual accident than could be recovered under employer's liability, but the aggregate burden is greater because of the many instances where damages are paid which but for the law would not be recoverable. The situation was aggravated by the amendment in 1906 compelling all employers to insure against having to compensate workmen for injuries received, and by the decision of the Court of Appeals that illness such as rupture and heat apoplexy are "accidents," if brought on by work in the course of a man's employment.

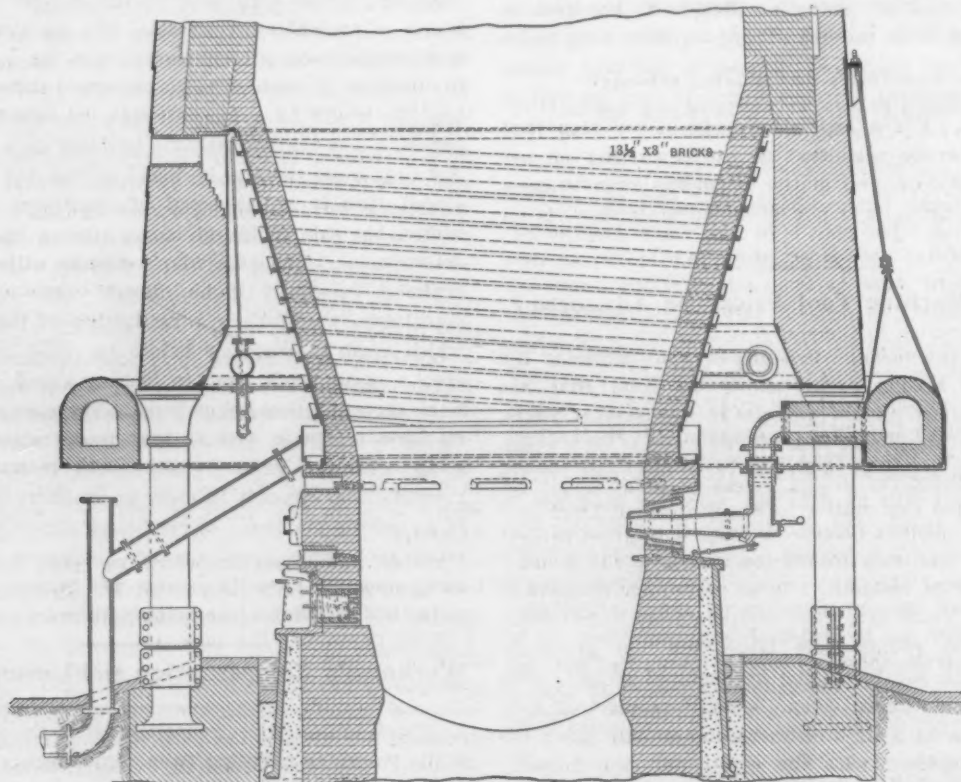
The insurance companies, which are in business for profit, are finding that policies which would cover all kinds of accidents and illness classed as accidents must cost the employers more than was at first anticipated. It has been demonstrated that the cost to the manufacturer since the enactment of the amendment of 1906 is several times increased. Employers, finding the terms more strict and in many cases more costly, are compelled

risks of all sorts and conditions of workers. Thus the effect indirectly will be to force employers to minimize such risk by insisting on medical examination themselves, and getting rid of a large body of workers who would not ordinarily be regarded as insurable.

CORRESPONDENCE.

Improved Bosh Construction for Blast Furnaces.

To the Editor: In a recent issue of *The Iron Age*, J. E. Johnson, Jr., of Glen Wilton, Va., makes an analysis of the best bosh construction for blast furnaces, and very interesting, indeed, are his results. The diagrams shown ought to open the eyes of furnacemen to the bad construction of a bosh with numerous bronze coolers that make the lower part of the furnace look like a scrap heap of piping, and to the fact that some forms of bosh construction are a menace both to the furnace and to the men about it. When the brickwork is worn out around some of the coolers and an explosion occurs when the pressure is excessive, half molten material and coke will find its way out; the hole grows larger and larger; then



The Sahlin Improved Blast Furnace Bosh Construction.

to minimize their liability by refusing to employ men whose physical condition is likely to increase the danger of fatal accident or disablement.

An attempt to balance the risk is made in some cases by paying off those who are not, in the opinion of the insurers, first class lives—that is, such as represent the minimum risk of death or disablement in the course of their employment.

In a great shipbuilding plant, which carries its own insurance, it is now the rule to take on no new workman who is over the age of 40, and to re-engage no workman whose age is over 50, after he has been paid off in a time of slackness. Since this system has been adopted as a policy of economy by self-insuring employers it may be anticipated that insurance companies in their compensation policies will impose the same strict conditions. *Engineering* of London, in discussing the question, says that the tendency assuredly is to make a medical examination of workmen compulsory, and even if this is not done by the insurance companies, they will charge their policy holders such a premium as will amply cover

the first steel band drops down, soon followed by others, and in a moment the whole bosh has collapsed, spreading fire, death and destruction all around. I know of at least one such terrible occurrence where the men around the furnace were killed like flies. But there is no change in the bosh construction; our fathers had it so, and, therefore, we dare not change it.

In his bosh diagrams Mr. Johnson has chosen a type of steel jacket which I would prefer not to use. No doubt such a jacket requires cooling plates at its top, as he suggests. However, his argument on the brick lining is quite correct.

In studying his valuable paper I find that his idea of an "improved construction" was long ago worked out by another engineer, and in a way that was a complete success under conditions prevalent. While the jacket shown by Mr. Johnson has been used in this country for many years, it was left for Axel Sahlin, the well-known engineer, now of Brussels, Belgium, to build a better one. He introduced and put into operation his patent water cooled steel jacket at a number of plants in Great Britain, and as far as I could judge from personal observation it was a great success. The accompanying drawing shows the lower part of an old English

blast furnace as remodeled by Mr. Sahlin years ago. The steel jacket is provided with spiral troughs. The cooling water enters at the top (or anywhere, for that matter), and runs like a rivulet in the troughs around and down the jacket, finally discharging into the circular waste water trough just above the tuyeres.

The lining is 13½ in., but might as well have been less, because part of it wore away; and it was interesting to note how the furnace lining, if this wearing had gone too far, soon mended itself and apparently assumed the proper thickness. As shown on the drawing there are bronze coolers around the tuyeres, but no coolers whatever at the top. There was no need of any; at least, I do not recollect that the furnace superintendent had any troubles.

Further description of this bosh is unnecessary; it is too well known on the other side. I simply wanted to refresh our memory on the fact that the "improved bosh construction" was a fact long ago over in Great Britain. Of course, the coolers used around the tuyeres were ordinary straight ones. Possibly Mr. Johnson's curved coolers would improve the construction still more; but cast iron coolers at the top with this type of jacket, whether straight or curved plates be used, would hardly be necessary.

BIRGER F. BURMAN.

BEAVER, PA., May 17, 1909.

A New Apprentice Educational Scheme.

To the Editor: You may be interested in knowing that a new scheme for educating the apprentice has been devised by the writer, and one that can be carried out in almost any city in the country in connection with private trade schools, public schools, or any other educational institution. The plan is to send the apprentice to school one-half day each week, the employer paying the apprentice for the time he is in school. This course is to be continued throughout the term of the apprenticeship contract, which in Cincinnati is four years. A committee of manufacturers, consisting of Fred A. Geier of the Cincinnati Milling Machine Company, Wm. Lodge of the Lodge & Shipley Machine Tool Company, James Hobart of the Triumph Electric Company, J. M. Manley of the National Metal Trades Association, Ernest Du Brul of the Miller, Du Brul & Peters Company and the writer, presented this matter to Superintendent Dyer of the Cincinnati public schools, who looks with great favor on the scheme and will present the matter to the Board of Education next Monday evening, with a recommendation to adopt it. It will doubtless be accepted and the school established not later than July 1.

There are about 500 apprentices working in the Cincinnati machine shops. The manufacturers have guaranteed to start the school off with 150 apprentices a week, which would make a class of 15 boys each half day for five days out of the week. The manufacturers feel that the sacrifice which they are making by paying the boys while they are at school will more than be returned by the increased efficiency, and that it will also be the means of securing many more apprentices than was possible in the past. We believe that the success of any apprentice system depends on some educational feature of this kind and it will certainly be of great value to the boy and to the trade generally.

The course of instruction will be confined to shop mathematics, shop drawing and such other particular studies as will be of direct benefit to the apprentice.

B. B. QUILLEN, PRESIDENT CINCINNATI PLASTER COMPANY.
CINCINNATI, May 22, 1909.

The Society for the Promotion of Engineering Education.—It has been decided to hold the seventeenth annual convention of this organization at Columbia University, New York, and Pratt Institute, Brooklyn, on June 24, 25 and 26. These dates immediately precede those of the meetings of the American Institute of Electrical Engineers, the Society for Testing Materials and the American Society of Civil Engineers. An unusually attractive programme has been arranged, which will include the report of the Joint Committee of Engineering Societies on Engineering Education by Dugald C. Jackson; a report of the Committee on Technical Books for

Libraries, by Arthur H. Ford; a report of the Committee on Engineering Degrees, by William F. M. Goss; a report of the Committee on Entrance Requirements, by Robert Fletcher, besides contributed articles. In addition, a special session will be devoted to the discussion of engineering mathematics by the committee appointed at the Chicago meeting of the American Association for the Advancement of Science, which has been requested to prepare a special report for the Society for the Promotion of Engineering Education. The president of the society is Charles S. Howe, Case School of Applied Science, Cleveland, Ohio, and the secretary is Arthur L. Williston, Pratt Institute, Brooklyn, N. Y.

Canada Gets the Preference but the United States the Trade.

TORONTO, May 21, 1909.—On their way across Canada to attend the Imperial Press Conference in the United Kingdom the delegates from Australia and New Zealand spent a few days at each of the principal stopping places. At Vancouver, Winnipeg, Fort William, Toronto, Ottawa and Montreal they were entertained and were encouraged to talk about subjects of common interest to the self-governing colonies. As the boards of trade at the several points visited took a prominent part in the hospitalities the question of commercial relations between Canada and the antipodean dominions was not lost sight of in the remarks of the delegates. In an interview Mr. Brett, the proprietor of the *Star and Weekly Graphic* of Auckland, New Zealand, and former Mayor of that city dwelt strongly on certain handicaps that Canada continues to maintain against itself in the competition for the New Zealand market. Though Canada, in common with other communities under the British flag, has the benefit of New Zealand's tariff preference, Canadian trade makes relatively slow headway in Mr. Brett's country. The preference is in the form of a surtax on goods coming from non-British countries, to which surtax about two-fifths of all the articles enumerated in the tariff are subject. In 1907 Canada sent to New Zealand goods to the value of \$873,067, which amount though small is much larger than that for any former year. In 1907 the United States' sales to New Zealand were of a total value of \$6,000,000.

Among the causes to which Canada's comparative backwardness is to be attributed Mr. Brett names bad packing and roundabout shipping. As exemplifying both of these drawbacks he cites the trade in wire nails. Wire nails sent from the United States are shipped in steel-hooped kegs. Those sent from Canada are in kegs bound by wooden hoops. Instead of forwarding the merchandise by Canadian railroad to a Canadian port on the Pacific, the Canadian exporter sends his merchandise via New York. This means a longer journey and increased handling for the poorly packed nails, whose weight often proves too much for the wooden hoops. As a consequence Canadian nails often come to hand in broken packages and considerable quantities are lost in transit. This is extremely unsatisfactory to New Zealand importers, who also object that the costs of transportation are swollen by the high cartage charges in New York. Further, if any freight has to be held back at New York it is the Canadian rather than the American. For these reasons the New Zealand demand for Canadian nails makes little progress, whereas the demand for American nails expands. Yet there is a tariff preference of 20 shillings per ton in favor of the Canadian as against the American nails. Mr. Brett advises Canadians to give more attention to the special requirements of New Zealand customers. He considers it important that direct steamship connection between New Zealand and Canada be established.

C. A. C. J.

The Pennsylvania Steel Company, Steelton, Pa., states that the published report is incorrect that its power plant has "two 12,000-kw. units using blast furnace gas for fuel." The plant has steam driven electric generators, the steam being generated by means of blast furnace gas under boilers in the usual way.

Finished Iron and Steel Production in 1908

In the current issue of the *Bulletin* of the American Iron and Steel Association a number of tables of statistics appear, supplementing those recently published in the annual report of the association for 1908, and completing the statistical statements for that year. The following compilation is made from them:

Plates and Sheets.

In 1908 the production of plates and sheets in the United States, excluding rail plate, amounted to 2,649,693 tons, against 4,248,832 tons in 1907, a decrease of 1,599,139 tons, or over 37.6 per cent. The following table gives the production by States of plates and sheets since 1906:

States.—Gross tons.	1906.	1907.	1908.
New England, New York and New Jersey.....	124,725	126,403	58,567
Pennsylvania.....	2,624,284	2,651,166	1,531,066
Delaware, Maryland and Virginia.....	25,500	28,420	25,000
West Virginia.....	148,684	153,590	159,714
Kentucky and Alabama.....	51,642	54,631	45,473
Ohio.....	818,769	851,987	603,213
Indiana, Illinois, Missouri, Wyoming and California.....	388,552	382,626	226,660
Totals.....	4,182,156	4,248,832	2,649,693

In 1908 117 works in 15 States rolled plates or sheets, against 134 in 17 States in 1907 and 134 in 16 States in 1906. A separation has been made for 1905, 1906, 1907 and 1908 of the production of iron and steel plates of No. 12 gauge and thicker from the production of iron and steel sheets of No. 13 gauge and thinner, classifying the former as plates and the latter as sheets. Black plates, or sheets, for tinning are included, but nail plate and skelp are excluded. The following table gives the production of iron and steel plates separately from 1905 to 1908 in gross tons:

—Plates—No. 12 and thicker.—			
	Iron.	Steel.	Total.
1905.....	10,022	2,031,184	2,041,206
1906.....	23,333	2,508,219	2,531,552
1907.....	30,277	2,629,783	2,660,060
1908.....	31,679	1,239,342	1,271,021

While plate production fell off 52.2 per cent. in 1908, sheet production decreased but 13.2 per cent. from the preceding year. The following table shows the production of iron and steel sheets from 1905 to 1908, in gross tons:

—Sheets—No. 13 and thinner.—			
	Iron.	Steel.	Total.
1905.....	62,134	1,428,890	1,491,024
1906.....	51,040	1,599,564	1,650,604
1907.....	43,761	1,545,011	1,588,772
1908.....	22,354	1,356,318	1,378,672

Pennsylvania rolled 77.1 per cent. of the plates in 1908 and 75.3 per cent. in 1907; it rolled 40 per cent. of the sheets in 1908, against 40.6 per cent. in 1907. Ohio rolled 10.7 per cent. of the plates and 33.8 per cent. of the sheets last year.

Black Plates and Tin and Terne Plates.

The actual production of black plates, or sheets, for tinning and close estimates of the production of tin plates and terne plates in the United States in the calendar year 1908 have been compiled by the American Iron and Steel Association. The figures are as follows:

Black Plates, or Sheets, for Tinning.—The production of black plates, or sheets, for tinning in 1908 amounted to 513,771 gross tons, against 504,072 tons in 1907, an increase of 9699 tons. The production by States in the last three years in gross tons follows:

	1906.	1907.	1908.
Pennsylvania.....	312,977	253,807	278,163
Maryland and West Virginia.....	94,076	95,939	92,860
Ohio, Indiana and Illinois.....	169,026	154,326	142,748
Totals.....	576,079	504,072	513,771

Tin Plates and Terne Plates.—The production of tin plates and terne plates in 1908 amounted to 1,203,075,000 lb., or 537,087 gross tons, as compared with 1,153,997,000 lb., or 514,775 tons, in 1907, an increase of 49,978,000 lb., or 22,312 tons. The following table gives the approximate production by States in 1908, in pounds:

	Tin plates.	Terne plates.	Total.
Pennsylvania.....	619,876,000	37,433,000	657,309,000
New York and West Virginia.....	164,013,000	37,076,000	201,089,000
Ohio, Indiana, Illinois and Michigan.....	265,007,000	79,670,000	344,677,000

Totals for 1908.....	1,048,896,000	154,179,000	1,203,075,000
Totals for 1907.....	996,650,000	156,447,000	1,153,097,000

About 26,217,000 lb. of the tin plates produced in 1908 were consumed by the makers in the manufacture of stamped ware. In addition to tin and terne plates small quantities of pure lead coated and aluminum coated steel sheets for special roofing purposes were produced in 1908.

The following table gives the production of tin plates and terne plates in the United States from the beginning of the industry in 1891 to the end of 1908. For 1900 the figures are for the census year ending May 31 and for 1904 for the census year ending December 31, the statistics for these two years having been collected by the Bureau of the Census:

Years.—Pounds.	Tin plates.	Terne plates.	Total pounds.
1891 (2d six months)...	368,400	1,868,343	2,236,743
1892 (calendar year)...	13,921,296	28,197,896	42,119,192
1893.....	64,536,209	59,070,498	123,606,707
1894.....	102,223,407	64,120,002	166,343,409
1895.....	165,927,907	88,683,488	254,611,395
1896.....	270,151,785	89,058,013	359,209,798
1897 (1st six months)...	203,028,258	49,545,643	252,573,901
1897 (2d six months)...	.....	.....	322,205,619
1898 (calendar year)...	.....	.....	732,289,600
1899.....	.....	.....	808,360,000
1900 (census year)...	707,718,239	141,285,783	849,004,022
1901 (calendar year)...	.....	.....	894,411,840
1902.....	.....	.....	806,400,000
1903.....	.....	.....	1,075,200,000
1904 (census year)...	867,526,985	158,857,866	1,026,384,851
1905 (calendar year)...	.....	.....	1,105,440,000
1906.....	1,100,373,000	193,367,000	1,293,740,000
1907.....	996,650,000	156,447,000	1,153,097,000
1908.....	1,048,896,000	154,179,000	1,203,075,000

Finished Rolled Iron and Steel in 1908.

The production of all kinds of iron and steel rolled into finished forms in 1908, including rolled forging blooms and rolled forging billets, amounted to 11,828,789 gross tons, against 19,864,822 tons in 1907, a decrease of 8,036,033 tons, or over 40.4 per cent. Of the total production in 1908 about 10,590,340 tons, or a little over 89.5 per cent., was rolled from steel and about 1,238,449 tons, or a little less than 10.5 per cent., from iron, as compared with about 17,664,736 tons, or almost 89 per cent., rolled from steel and about 2,200,086 tons, or a little over 11 per cent., rolled from iron in 1907.

The following table gives the production in gross tons of all leading articles of finished rolled steel in 1908 as compared with finished rolled iron. Rolled forging blooms and rolled forging billets are not included for 1904:

Products.—Gross tons.	Iron.	Steel.	Total.
Rails.....	71	1,921,540	1,921,611
Structural shapes.....	2,423	1,080,758	1,083,181
Plates and sheets.....	54,033	2,595,660	2,649,693
Nail plate.....	15,482	30,265	45,747
Wire rods.....	509	1,816,440	1,816,949
Rolled forging blooms and forging billets.....	282	121,039	121,321
Merchant bars.....	683,233	1,301,405	1,986,638
Skelp, flue, &c.....	297,049	853,534	1,150,583
Splice bars.....	10,502	81,308	91,810
Hoops.....	1,000	169,860	170,860
Bands and cotton ties.....	293	238,148	238,441
All other finished rolled.....	171,572	380,383	551,955

Totals for 1908.....	1,238,449	10,590,340	11,828,789
Totals for 1907.....	2,200,086	17,664,736	19,864,822
Totals for 1906.....	2,186,557	17,401,911	19,588,468
Totals for 1905.....	2,059,990	14,780,025	16,840,015
Totals for 1904.....	1,760,084	10,253,297	12,013,381

Nail Plate.

The production in the United States of iron and steel plate for the manufacture of cut nails and cut spikes in 1908 amounted to 45,747 tons, against 52,027 tons in 1907, a decrease of 6280 tons, or over 12 per cent. Of the total production in 1908 about 30,265 tons were steel and about 15,095 tons of iron in 1907, a decrease in steel nail and spike plate of 6667 tons, but an increase in iron nail and spike plate of 387 tons. The following table gives by States the production of nail and spike plate in the last three years in gross tons:

	1906.	1907.	1908.
Pennsylvania	32,039	32,004	26,148
Massachusetts, West Virginia and Kentucky	13,779	13,179	14,406
Ohio, Illinois and California	8,393	6,844	5,193
Totals	54,211	52,027	45,747

Hammered Charcoal Iron Blooms and Billets.

The production of iron blooms, billets and bars in charcoal bloomeries from pig iron or from pig iron and scrap, for the consumption of the makers or for sale, amounted in 1908 to 55,973 tons, against 84,623 tons in 1907 and 94,999 tons in 1906. All the iron blooms, slabs, billets and bars reported for 1908 were made with charcoal, but of the total in 1907 about 4513 tons was made with natural gas alone and natural gas and charcoal. Of the total production in 1908, 47,870 tons was for the consumption of the makers and 8103 tons for sale, against 67,069 tons for the consumption of the makers and 17,554 tons for sale in 1907. In 1906 77,166 tons was made for the use of the makers and 17,833 tons for sale. Charcoal iron blooms are chiefly used in the manufacture of skelp for boiler tubes and in the manufacture of black plates for terne plates. About four-fifths of the annual production is consumed by the makers. The following table gives the production by States of hammered blooms, billets, bars, &c., in charcoal bloomeries from 1906 to 1908:

States.—Gross tons.	1906.	1907.	1908.
Pennsylvania	83,076	71,099	46,144
Delaware, Maryland, Kentucky and Ohio	11,923	13,524	9,829
Totals	94,999	84,623	55,973

Forges for the manufacture of blooms and billets from iron ore have not been in operation in the United States since 1901, in which year the blooms and billets so made amounted to 2310 gross tons, made in the State of New York. All the Catalan forges in the United States have long been abandoned.

The National Association of Manufacturers.

The proceedings of the first two days of the annual meeting of the National Association of Manufacturers at the Waldorf-Astoria, New York City, were briefly recorded in last week's issue of *The Iron Age*. On Wednesday, May 19, the closing day, important action was taken on the tariff question in the adoption of the following declaration:

We reaffirm our unqualified indorsement of the American policy of protection, which implies the utilization of the tariff for the development of American industry and the protection of American labor, under which this country has prospered beyond any other and has attained its present position as the greatest industrial nation of the world.

As a most effective means of insuring the continuance of this policy for the preservation of the home market, of adapting it to present conditions and of promoting the greater development of our foreign trade, especially the larger conversion of our raw materials into finished products before their exportation, we heartily favor the creation of a board to study and report upon industrial and commercial facts pertinent to the tariff for the use of Congress and the Executive.

We desire to express our appreciation of the action of Senator Aldrich and the Finance Committee of the Senate in embodying in their report on the tariff bill legislation giving the President of the United States power to initiate such a policy, and we urge upon Congress that the power thus recommended be granted to this end, the proposed legislation being as follows:

"That to secure information to assist the President in the discharge of the duties imposed upon him by section 2 of this act, information which will be useful to Congress in the preparation of tariff legislation and to the officers of the Government in the administration of the customs laws, the President is hereby authorized to employ such persons as may be required to make thorough investigations and examinations into the production, commerce and trade of the United States and foreign countries and all conditions affecting the same."

A resolution was also passed recommending to Congress the passage of an act "providing for sufficient postal compensation to establish a swift and regular service in American built steamships to the principal countries of South America and to the ports of Australasia, Japan, China and the Philippines."

James A. Emery, counsel of the association, delivered an address at the afternoon session on "Legislation Af-

fecting Labor Relations." He spoke of the recent attempts of organized labor to have laws passed favoring their interests.

The determination of the members of the association to continue the aggressive policy against labor organizations maintained by the administrations of D. M. Parry and James W. Van Cleave was shown by the unanimous election as president of John Kirby, Jr., of the Dayton Mfg. Company, Dayton, Ohio. Mr. Kirby has for years been conspicuous in movements against organized labor. He is an able orator and a master of scathing language. His speech on accepting the office demonstrated his determination to maintain his reputation as an uncompromising foe of the methods of modern labor leaders.

Frank H. Stillman of the Watson-Stillman Company, New York, was re-elected treasurer. The following were elected directors at large: James W. Van Cleave, D. M. Parry, D. A. Tompkins, Ludwig Nissen, J. G. Battelle and C. W. Post. The following vice-presidents were elected by their State delegations to represent the various States: Connecticut, Charles M. Jarvis; Delaware, Edward T. Betts; Georgia, E. G. Gordon; Illinois, William H. Parlin; Indiana, C. C. Hanch; Kentucky, W. H. Logan; Maryland, William A. Dickey, Jr.; Massachusetts, Geo. T. Coppins; Michigan, Henry B. Joy; Missouri, F. C. Schwedman; New Hampshire, E. Bertrand Pike; New Jersey, Enos Paullin; New York, Giles H. Stillwell; Ohio, George D. Selby; Pennsylvania, Daniel C. Ripley; Rhode Island, Wallace L. Pond; Tennessee, H. S. Chamberlain; Vermont, N. K. Williams; West Virginia, W. A. B. Dalzell, and Wisconsin, H. E. Miles.

In token of the appreciation with which the association regards the work done for it during his three years of office, the retiring president, James W. Van Cleave received from the members a most artistic bronze tablet, commemorating his services, a ruby and diamond tie pin, and a check for \$10,000, accompanied by an illuminated address. The presentation was made by Ludwig Nissen. In addition the California members of the association gave Mr. Van Cleave a diamond ring and the heads of departments of the New York office of the association presented to him the gold badge of the association with a diamond in the center.

The Board of Directors met on Thursday and re-elected George S. Boudinot secretary. The headquarters of the association are maintained at 170 Broadway, New York.

The Engineers' Society of Pennsylvania.—Under the auspices of this organization, a convention of State engineers will be held in Harrisburg, Pa., June 9, 10 and 11. A bulletin has been issued giving a preliminary programme of the proceedings. A long list of lectures has been provided for, and arrangements have been made for excursions to points of interest, embracing manufacturing plants in the vicinity as well as local features of engineering interest. An association is being formed within the charter of the Engineers' Society of Pennsylvania for the purpose of holding annual conventions of this character. The president of the Engineers' Society is F. Herbert Snow; first vice-president, F. B. Musser; second vice-president, John Price Jackson; secretary, E. R. Dasher; treasurer, John H. Myers. The headquarters of the society are in the Gilbert Building, Harrisburg, Pa.

New Demurrage Rules Hearing.—There will be a public hearing in the rooms of the Interstate Commerce Commission, Washington, June 4 and 5, on the new demurrage code prepared by a committee of the National Association of Railroad Commissioners. It is the desire of the committee to hear the views of shippers as well as carriers as to the proposed regulations. The purpose is to obtain a comprehensive code that shall apply alike to State and interstate transportation.

The largest locomotive ever built, weighing 600,000 lb., is now on the way to Sacramento, Cal., for the Southern Pacific. It was built at the Baldwin Locomotive Works.

The Tariff Bill in the Senate.

WASHINGTON, D. C., May 25, 1909.—The Senate has again reviewed the metal schedule during the past week and there now remain but three or four items to be acted upon. Progress on the measure has not been consecutive, but Senator Aldrich is authority for the estimate that two-thirds of the bill has been disposed of. Both Democrats and insurgent Republicans thus far have resisted the fixing of a date for the final vote on the measure in the Senate, but it is probable that it will be taken about June 10 or 15, and that the bill will remain in conference a fortnight, becoming a law about July 1. It will be remembered that the Dingley bill was in conference 19 days, but as to the pending measure considerable progress has already been made, through informal conferences, in harmonizing the differences between the House and Senate leaders on many important items.

New Rates on Zinc Products.

Following the discussion of the metal schedule as reported in this correspondence a week ago, Senator Smoot of Utah, on behalf of the Finance Committee, presented an amendment embodying substitutes for paragraphs 190 and 191, relating to zinc ore and zinc products, as follows:

190. Zinc-bearing ores of all kinds, including calamine, containing less than 20 per cent. of zinc, one-quarter of 1 cent per pound on zinc contained therein; containing 20 per cent. of zinc and less than 25 per cent., one-half of 1 cent per pound on the zinc contained therein; containing 25 per cent. of zinc and less than 30 per cent., three-fourths of 1 cent per pound on the zinc contained therein; containing 30 per cent. of zinc or more, 1 cent per pound on the zinc contained therein. [The usual provision as to sampling by Government officers follows.]

191. Zinc in blocks or pigs, $1\frac{1}{4}$ cents per pound; in sheets, $1\frac{1}{2}$ cents per pound; in sheets, coated or plated with nickel or other metal, or solutions, $1\frac{3}{4}$ cents per pound; old and worn out, fit only to be remanufactured, 1 cent per pound.

Rates on Machinery.

Paragraph 194, covering machinery of all kinds, agreed to on a previous reading of the bill, was reopened at the instance of the Finance Committee to permit Chairman Aldrich to withdraw the proviso permitting the free entry until July 1, 1911, of levers and gothrough lace machines. In explanation of this change Senator Aldrich said that upon investigation the committee had ascertained that a large number of manufacturers engaged in the production of embroidery and lace by machinery had imported their machines and paid duty thereon, which rendered it inequitable that other competing manufacturers should now be permitted, even for a period of but two years, to bring in machines free of duty. The Senate agreed to the amendment.

Before paragraph 194 as amended was finally adopted, however, it was subjected to critical examination by a number of Senators and formed the basis of a spirited debate upon several of its most important provisions. Senator Paynter offered an amendment reducing the rate of duty on typesetting machines from 30 per cent. ad valorem, as provided in the bill, to 10 per cent. ad valorem. The amendment was defeated by a vote of 43 to 35. Senator McLaurin moved another amendment striking printing presses, sewing machines and typewriters out of paragraph 194 and adding thereto the following proviso: "Notwithstanding anything in this bill contained, printing presses, sewing machines and typewriters when imported into this country shall be exempt from the payment of duty." This amendment was lost by a vote of 53 to 23. Senator Newland offered an amendment reducing the duty on cash registers, linotype and all typesetting machines, machine tools, printing presses, sewing machines, typewriters and all steam engines from 30 to 20 per cent. ad valorem. Senator LaFollette supported the amendment, especially as applied to typewriters, which he said were sold in this country at about \$100 apiece, although sold abroad at not to exceed \$85. The domestic price had been kept up, he said, as the result of the formation of a typewriter combination organized in 1893 under the laws of New Jersey, and known as the Union Typewriter Company, in which five of the leading

manufacturing companies were consolidated with a capital of \$18,000,000. Senator Newlands' amendment was rejected by a vote of 43 to 29 and paragraph 194 was adopted in the following form:

194. Cash registers, linotype and all typesetting machines, machine tools, printing presses, sewing machines, typewriters, and all steam engines, 30 per centum ad valorem; embroidery machines and lace making machines, including machines for making lace curtains, 45 per centum ad valorem.

Automobiles, Bicycles, Etc.

Senator Aldrich called up paragraph 140 of the metal schedule, providing a duty of 45 per cent. on "automobiles, bicycles and motorcycles and parts of any of the foregoing, including tires, axles and ball bearings," passed over on previous readings at the instance of Senator Bulkeley of Connecticut. The object in passing over the paragraph was to secure time in which to redraft the language so as to exclude tires and confine the assessment of the rate of 45 per cent. to finished parts of automobiles, bicycles, &c. Senator Gallinger proposed an amendment increasing the rate on automobiles and finished parts thereof to 50 per cent. and leaving the other articles in the paragraph dutiable at 45 per cent., which was thereupon adopted as follows:

140. Automobiles and finished parts thereof, not including tires, 50 per cent. ad valorem; bicycles and motor cycles, including the finished parts thereof, not including tires, 45 per cent. ad valorem.

Rates on Ferroalloys.

The Senate then took up paragraph 182, covering ferroalloys, which is regarded as one of the most important features of the metal schedule. Senator Dick of Ohio, presented an amendment increasing the rate on ferrosilicon containing not more than 15 per cent. of silicon from \$4 to \$6 per ton. Senator Aldrich at first was inclined to oppose the amendment, stating that "a large number of Senators, a number of people interested in blast furnaces, and people who are engaged in producing various forms of metal, are desirous of having the rate decreased from \$4 to \$2.50 per ton." Senator Dick retorted that the users of ferrosilicon ought to be willing to allow a sufficient protection to this industry to give it a chance to live in this country. A duty of \$4 would not do it nor would a \$5 rate do it, but under a \$6 duty the industry might reasonably be expected to grow at a normal rate. Senator Heyburn of Idaho, made an appeal for a higher rate than 25 per cent. ad valorem on tungsten. Senator Aldrich having signified his willingness to accept Senator Dick's amendment increasing the rate on ferrosilicon, the change was adopted and upon assurances from the Finance Committee that later in the proceedings a special provision would be reported for tungsten ore as distinguished from the metal, Senator Heyburn withdrew his objection and the paragraph relating to ferrosilicon was thereupon adopted as follows:

182. Chrome or chromium metal, ferrochrome or ferrocromium, ferromolybdenum, ferrophosphorus, ferrotitanium, ferrotungsten, ferrosilicon containing more than 15 per centum of silicon, ferrovandium, molybdenum, titanium, tantalum, tungsten, or wolfram metal, valued at \$200 per ton or less, 25 per centum ad valorem; valued at more than \$200 per ton, 20 per centum ad valorem; ferrosilicon valued at not exceeding \$90 a ton or containing more than 15 per centum of silicon, \$6 per ton.

The steel makers, especially the so-called independents, are dissatisfied with the treatment of the ferroalloys by the Senate, and will make a strong effort to secure the reconsideration of the provision adopted and, failing in that, will endeavor to have the duties reduced in conference. The pig iron duty fixed by the Finance Committee has not yet been adopted by the Senate, paragraph 116 having been passed over for future consideration.

While the metal schedule has now been practically completed, nothing remaining to be acted upon except pig iron, hoop or band iron, wire nails, hooks and eyes and zinc products, the entire schedule is still regarded as subject to amendment in committee of the whole, and separate votes will undoubtedly be demanded on several of the paragraphs when the measure is reported to the Senate.

W. L. C.

PERSONAL.

Geo. B. Foster, formerly district manager of the Allis-Chalmers Company at Chicago, has been appointed representative there of the Case Crane Company, Columbus, with office in the Fisher Building. He is also manager of the Power Improvement Company.

D. J. Fleming has been engaged by the Westinghouse Electric & Mfg. Company, having previously held similar positions with the General Electric Company and Allis-Chalmers Company.

The Standard Contracting Company, Cleveland, Ohio, has secured the services of H. D. Perkins, heretofore superintendent of bridges and buildings of the Illinois Traction Company.

J. F. Jones, who has been with the Ft. Wayne Electric Company, recently entered the transformer department of the Wagner Electric Mfg. Company, St. Louis.

The Northern Idaho & Montana Power Company, Sand Point, Idaho, whose extensive development projects were recently mentioned in *The Iron Age*, has secured as commercial agent E. B. Kost, an expert in the use of industrial power. He was formerly with the Washington Water Power Company.

The Carl-Lueg medal has been awarded at the last meeting of the German Society of Iron Masters to Dr. L. Beck, the author of the monumental history of iron and steel.

William Zimmerman, president of the Zimmerman Steel Company, Lone Tree, Iowa, will leave New York for Europe June 1. He will make a three months' tour through Germany, Austria, Russia and Sweden. In all these countries the company has selling agencies.

R. E. S. Geare, formerly Eastern sales manager for the Dayton Hydraulic Machinery Company, Dayton, Ohio, has become assistant sales manager for the Pratt Engineering & Machine Company, Atlanta, Ga., with offices at 50 Wall street, New York. The Pratt Engineering & Machine Company builds sugar mills, fertilizer plants, chemical plants and a line of steam and centrifugal pumps.

Admiral W. H. Bronson has been elected a director of the International Nickel Company to succeed the late Joseph Wharton.

Henry J. Weber, formerly president of the Weber Foundry Company, Cincinnati, which was taken over by the Wessling Brothers, previous owners, has engaged with the John B. Morris Foundry Company in the same city. He will be chief salesman in the castings department.

William H. Hulick of the Warren Foundry & Machine Company, 111 Broadway, New York, has recovered from a serious illness and has resumed his regular duties.

J. P. Morgan, Jr., has been elected a director of the United States Steel Corporation to fill the vacancy made by the death of H. H. Rogers. His term will expire in 1910.

Chairman E. H. Gary of the United States Steel Corporation will sail for Europe about the middle of July.

Among the published arrivals in New York from abroad on Tuesday appears the name of Baron von Bodenhausen, chief director of the Krupp establishment in Germany, who is stated to contemplate a four months' pleasure trip in this country.

The Southern Iron & Steel Company.—The reorganization of the Southern Steel Company having been practically completed, the permanent Board of Directors of the new Southern Iron & Steel Company has been elected as follows: James T. Woodward, Cornelius Vanderbilt, Alexis W. Thompson, president Inland Steel Company; Kenneth K. McLaren, Franklin Q. Brown of Redmond & Co., R. B. Van Cortlandt of Kean, Van Cortlandt & Co.; Walter T. Rosen of Ladenburg, Thalmann & Co.; C. S. Boughton, W. P. G. Harding, president First National Bank, Birmingham, Ala.; R. T. Wilson, Jr., W. W. Miller of Hornblower, Miller & Potter; W. H. Hassinger of Birmingham, Ala.; William B. Denton, Cecil

A. Grenfell of London, England; T. S. Kyle, vice-president First National Bank, Gadsden, Ala.; D. G. Boissevain of Kean, Van Cortlandt & Co. The board subsequently elected the following officers: W. H. Hassinger, president; James T. Woodward, chairman of the Executive Committee; W. W. Miller, vice-president; A. R. Forsyth, secretary and treasurer; D. G. Boissevain, secretary of the Executive Committee and assistant secretary and assistant treasurer of the company. The board has been constituted so as to include several large financial interests, practical steel men and some representative local men in Alabama.

The Steel Corporation Issues More Railroad Bonds.

The United States Steel Corporation has sold to William A. Read & Co., bankers, New York, \$9,000,000 of first mortgage bonds against the Chicago, Lake Shore & Eastern Railway Company. The bonds bear 4½ per cent. interest and mature in 60 years, although they are redeemable in 10 years, at 110 and interest. They are guaranteed, principal and interest, by the Elgin, Joliet & Eastern Railroad Company, and by the United States Steel Corporation.

Security for the bonds is furnished by a first and sole mortgage on all the railroad, equipment and other property of the company, which includes the terminal railroads at the new Gary plant and at the Illinois Steel Company's plants. The terms of the indenture prescribe that bonds can be issued only up to 50 per cent. of the total outlay on the property mortgaged.

It is explained that this sale of bonds does not imply an abandonment of the Steel Corporation's fiscal policy, under which \$350,000,000 have been spent out of current earnings to capital account since its organization. The issue was made, it is said, through a feeling on the part of the management that the company's receipts from the steel industry ought not to be diminished for the benefit of a railroad enterprise in which, it is understood, there are several stockholders who are not otherwise interested in the Steel Corporation.

Blacksmiths' Data.—The Jamison Coal & Coke Company, Frick Building Annex, Pittsburgh, Pa., has had compiled by H. E. Robertson, for the use of workers of iron and steel, a pamphlet entitled "Iron and Steel Measurements and Weights for Use of Blacksmiths." It is a collection of useful information and data. Included under the heading "Mensurations," formulas for finding the lengths of the perimeters and areas of various geometrical figures and contents of solids are given. There are also tables of the weights of round and square steel from ¼ in. to 48 in., in lengths of 1 in. and 1 ft. decimal equivalents of the fractional parts of an inch, and size, area and circumference of circles in inches. This book is free from advertising, other than on the inside cover, which calls attention to Jamison's Crabtree washed smithing coal as one especially adapted for blacksmithing of all kinds.

Officers, members of the Administrative Council and Commissioner Weust of the National Metal Trades Association attended the meeting held at the Claypool Hotel, Indianapolis, May 17, to consider the promotion of industrial education. After considerable discussion it was decided to hold the matter in abeyance for the time being. It will be taken up for further discussion at the next meeting of the Executive Committee of the association. A visit was made to the Winona Technical Institute, and the officers of the Metal Trades Association were much gratified with the progress made in the machine shop of that institution.

Forty carloads of San Francisco scrap iron will be taken to Genoa, Italy, by a vessel now being loaded at Oakland, Cal. The scrap is iron that went through the great fire of 1906. Two years ago a smaller consignment was sent to Italy, which met with favor for a special use.

The Side-Blow Converter for Steel Castings.*

BY J. S. WHITEHOUSE, COLUMBUS, OHIO.

The side blow converter has, I believe, firmly established itself in America and overcome the strong prejudice which existed against it some years ago. When this converter was first introduced in this country claims were made for it which, to say the least, were absurd. These claims led a great many to rush into the steel business without any knowledge on the subject. They organized companies and voted themselves large salaries as officers. They then placed their order with the agents for the necessary equipment. For this equipment they paid usually \$10,000 to \$20,000, and it can be duplicated to-day for \$4000 to \$5000. The rest of the capital as a rule went into buildings, engine, crane, and office furniture. Then with a balance in the bank of \$5000 to \$10,000 they were ready to make steel castings and a fortune. A young man at \$15 per week was engaged to make steel, and a foundry foreman who was a good talker hired to look after the shop.

The expert came and stayed a month, taught the young man to tell the drop of the flame and left. Everything would go fine for a few days or weeks, until one day the charge would not blow right; then the trouble would start. The percentage of good castings, instead of running 80 per cent. of the charge, did well if it reached 40. The cost of castings ran about 6 to 7 cents per pound and the selling price from 4 to 5 cents. In the few cases where the firm pulled through it was either wise or lucky enough to get good men who understood the steel business, and to leave them alone.

The Waste in Converting.

Now, as to the loss, which has been a great drawback to the converter. This is not the fault of the process, but of the inexperienced or careless operator. You would not think of putting your open hearth in charge of a green man just out of college, but in most cases this is just what has been done with the converter. The open hearth melter is a man of experience and brains, and draws a good salary and most steel blowers do the same to-day. A man may be able to tell the drop of a good blow in a few weeks, but to be a good blower he should have at least a year's experience, as all heats do not work alike. He should have a good eye and plenty of nerve, for he will need both. He should be able to tell the temperature of his metal soon after the flame starts and to judge the silicon by the first period. He should be able to tell if his blow is done by looking at the slag, as well as by the flame. He should know how to keep his lining in the best shape to get all the heat possible from the process, and the hundred little kinks of the trade, which, as a rule, the expert will never impart, as these are what make him an expert. The man with the above qualifications will blow with a loss of less than 17 per cent. (about 15).

With proper blowing the main loss comes from the silicon in the charge, usually 2 per cent., which is oxidized along with iron and manganese to form the slag. The writer learned to blow with 2 per cent. silicon, but for the last three or four years has been blowing iron analyzing from 0.90 to 1.25 per cent. silicon from the cupola in 2-ton charges, and very often has been obliged to use scrap while blowing. Another advantage is the increase in the amount of scrap which can be carried, and which helps to cut down the cupola loss by increasing the carbon in the charge. For example: I charge 50 per cent. of pig with about 3.75 per cent. carbon and 50 per cent. scrap with 0.25 carbon. Tests of the cupola iron ran 3.25 to 3.50 per cent. carbon, a gain of 1.25 to 1.50 per cent. of carbon taken from the coke instead of bought in the form of pig iron. Regardless of what has been written, 50 per cent. of scrap can be melted in the cupola with good results and using only 12½ per cent. of coke, but your blower must have a complete knowledge of cupola practice.

Most blowers use too much volume and too high a pressure to get the best results, and with low silicon the

volume and pressure must be low. No two blows will act alike and will require different treatment, which can be determined by the flame, but which I find impossible to describe. I believe it is as necessary for a blower to regulate his air valve to get the proper combustion as it is for the melter to adjust his air and gas valves. With ordinary care the steel produced in a converter is very uniform in carbon and silicon; more so, I think, than the open hearth. The greatest variation seems to be in manganese, the temperature of the metal and the condition of the slag causing more of a variation than in acid open hearth practice. It is possible to run several weeks without taking an analysis and find at the end of the run very little variation in the elements. This is possible in the acid open hearth, but never practiced, as the risk is great, while I have known of it being done right along in converter practice.

There is much which could be said regarding the making of molds, &c., but the practice is identical with open hearth, except that the castings are for the most part lighter. The ordinary converter shop with one 2-ton converter is capable of producing between 100 and 150 tons of good castings per month, blowing three times a week, and should not be expected to carry the overhead expense of a shop turning out 500 to 600 tons, yet this has often been the case.

OBITUARY.

WILLIAM CHRISTIE HERRON died at his home in Cincinnati, Ohio, May 21, aged 66 years. He was born in Cincinnati in 1843. He enlisted in the Union forces in the Civil War, taking service in the navy. When the war ended he embarked in the hardware business in Cincinnati, afterward opening up a similar establishment in Dayton, Ohio. The early acquaintance with the iron business proved a strong factor in determining his future connections, and during the greater part of his middle life he was actively engaged in the pig iron trade. In 1891 he became connected with the house of Rogers, Brown & Co., being a large owner of stock and an officer of the company at the time of his retirement in 1902. He was also vice-president of the American National Bank of Cincinnati, which was recently merged with the Fifth-Third, when he became a director of that institution. He was very conspicuous in the work of the Y. M. C. A. and in many local charitable enterprises. In the great world movement championing the cause of peace, Mr. Herron was foremost and held high honors with the International Peace Society. He leaves a widow and two sons.

EDWARD P. WHITE, for many years a prominent figure in the metal trade of New York, died May 18 at Hampton, Va., in the 65th year of his age. He was more particularly identified with the tin trade between 1868 and 1890. From 1898 to 1904 he was active in Boston.

RUFUS K. WOOD, general agent of the Maryland Steel Company and a brother of F. W. Wood, president of the company, died May 16 at his home at Sparrows Point, Md., as the result of an accident sustained two weeks before, when his right leg was broken by a boom of a vessel at the steel works falling upon it. Mr. Wood was 60 years old. He was born at Lowell, Mass.

The National Electroplaters' Association of the United States and Canada has been formed recently, and at the second meeting of the organization, held in New York, May 7, 28 members were present. Charles H. Proctor, supervisor F. H. Lovell Company, Arlington, N. J., is president; Benjamin W. Glichrist, foreman plater, Lallance & Grosjean Mfg. Company, Woodhaven, N. Y., secretary, and Nathan S. Emery, foreman plater, Victor Typewriter Company, New York, treasurer. The plating industry was included in the scope of the American Brass Founders' Association, formed at Philadelphia, in 1907, which held its third annual convention at Cincinnati last week, and a number of firms whose business includes electroplating are represented in the latter.

* From a paper read before the American Foundrymen's Association, Cincinnati, May, 1909.

NEWS OF THE WORKS.

Iron and Steel.

The Legislature of Texas has passed a bill providing an appropriation of \$100,000 to lend to the State Penitentiary Board to purchase supplies and place the iron furnace at Rusk in blast.

One blast furnace of the Ashland Iron & Mining Company, Ashland, Ky., was blown in May 24.

Ellery F. Coffin & Co. put their furnace at Muirkirk, Md., in blast May 22, and it is now on full burden, making high grade charcoal iron.

The furnace and property of the Durham Iron Company, Riegelsville, Pa., were sold recently for \$25,000 to William J. Fling, Germantown, Pa., who represented the bondholders. The furnace, which has an annual capacity of about 39,000 tons, was last active in 1908.

General Machinery.

Recent sales of the Vilter Mfg. Company, Milwaukee, Wis., include: People's Light, Ice & Storage Company, McKeesport, Pa., 12-coil atmospheric ammonia condenser; Bunte Brothers, Chicago, Ill., 15-ton refrigerating machine with direct expansion pipe for cold storage purposes; Leonard D. Hosford, New York, for export to Panama, can ice making plant; Howard Ship Yards Company, Jeffersonville, Ind., combined refrigerating and 50-ton can ice making plant; Wisconsin State Reformatory, Green Bay, Wis., 25-ton refrigerating plant; Rockwood & Co., Brooklyn, N. Y., 50-ton refrigerating machine; Hygeia Ice & Coal Company, Portchester, N. Y., 75-ton atmospheric ammonia condenser; Punxsutawney Ice Company, Punxsutawney, Pa., 50-ton refrigerating plant; Roth-Blum & Co., San Francisco, Cal., 50-ton refrigerating plant; Columbia River Packers' Association, Astoria, Ore., 20-ton can ice making plant; Hammond Packing Company, Hoboken, N. J., 25-ton refrigerating machine.

Machinery for a new iron ore washing plant is to be installed this summer by the Williamsville Iron Mt. Ore Company, Williamsville, Mo.

The recent fire in the plant of the Wehrle Company, manufacturer of stoves, ranges and safes, Newark, Ohio, damaged considerable of the machinery, but as the company has sufficient for its present needs it will not purchase any new machinery for at least six months.

The new building to be erected by the Saranac Machine Company, St. Joseph, Mich., will be 80 x 125 ft., one story, with saw tooth roof. It has not been decided whether to construct the building of concrete, steel or mill construction, but it will be built as nearly fireproof as is possible.

The Schnelble Company, manufacturer of brewing machinery, New York and Chicago, has commenced construction of a new plant at Buffalo, N. Y., at Elk street and the New York, Chicago & St. Louis Railroad, 50 x 250 ft., of brick and steel construction, to be completed July 15. The New York plant of the company, which it has occupied for 20 years, will be closed down and the equipment moved to Buffalo. Some additional machinery will be required, however.

A garage is being erected at Goodland, Ind., by C. M. Bell, which is to be equipped with tools and machinery for repair work.

The Capell Fan & Engineering Company, Monongahela City, Pa., which recently had a fire at its plant, has removed all serviceable machinery to the plant formerly operated by the Black Diamond Engineering Company at that place, where a consolidation has been effected, to be known as the Herron-Webb Engineering Company. The new company will continue to manufacture the Capell mine fan, haulage engines, sheaves, &c., and will add the Black Diamond boring machine for boring out armature bearings, &c. A small extension is to be built to the machine shop, its equipment rearranged, as well as additions to the forge shop and stockroom made.

The Crocker-Wheeler Company, Ampere, N. J., has recently sold squirrel cage induction motors aggregating 2200 hp. to the Bonnie Cotton Mills, Kings Mountain, N. C.; 500 hp. of synchronous motors, Youngstown Sheet & Tube Company, Youngstown, Ohio; 21 Form W motors aggregating 655 hp., for rolling mill service, Indiana Steel Company, Gary, Ind.

The American Oli Engine Company, Danielson, Conn., manufacturer of stationary, automobile and marine kerosene engines, ranging from 1/2 to 100 hp., has leased a site and building on North Water street, Poughkeepsie, N. Y., which it will remodel and equip. The machinery at the present plant at Danielson will be moved to the new location and considerable new machinery will be added.

The Indianapolis Machinery Exchange, Indianapolis, Ind., has increased its capital stock from \$10,000 to \$15,000. Alfred R. French is president of the company.

Foundries.

L. C. Tarras, Winona, Minn., is arranging to increase the capacity of his foundry by the addition of a building, 50 x 60 ft., for which some new machinery will be required.

The Bethlehem Foundry & Machine Company, South Bethlehem, Pa., will dismantle part of its foundry and on the site

will erect a modern building which will be equipped with an electric traveling crane, cupola and other modern machinery. The plant is being operated on full time and it has become necessary to increase the capacity to cope with the growing business. It is hoped to have the new building completed in about 60 days.

An extension to its water system, including a steel water tank and 60,000 ft. of 12-in. cast iron pipe, has been decided upon by Norway, Mich.

The National Malleable Castings Company, Toledo, Ohio, is reported to have determined upon installing additional motors for electric drive.

The Michigan Crucible Steel Castings Company, Detroit, Mich., has purchased 5 1/2 acres of ground at Mt. Elliott and Milwaukee streets, where it will erect new buildings, plans for which have not yet been completed. It is expected that the new buildings will be ready for occupancy within a year.

The Olympic Foundry & Machine Company, Tacoma, Wash., has filed articles of incorporation with a capital stock of \$25,000. C. N. Bokine is interested.

The plant of the Dundee Mfg. Company, Dundee, N. Y., manufacturer of brass goods, plumbing supplies, &c., was practically destroyed by fire May 17, with a loss of \$25,000. The plant consisted of a one-story foundry and machine shop, 48 x 120 ft. and had only been in operation since January 1. The plant is to be rebuilt at once.

The Damascus Bronze Company, N. S., Pittsburgh, manufacturer of brass and bronze castings, making a specialty of railroad and mill bearing work, recently awarded a contract to the McClintic-Marshall Construction Company, Pittsburgh, for a steel addition to its foundry, 75 x 100 ft., to have brick walls and tile roof. The building will be ready for operation by October 1, and will increase the capacity of the plant about 50 per cent.

The Chicago Malleable Castings Company, West Pullman, Chicago, Ill., has about completed a new two-story brick office building, new cupola room with electric elevator and modern appliances for the economic handling of its business. The company has enjoyed a steady run during the business depression and is now operating about 90 per cent. of its capacity.

Power Plant Equipment.

Having decided to increase the output of its plant, the Lytle Creek Power Company, San Bernardino, Cal., will vote a bond issue to the amount of \$300,000 to cover the cost of contemplated improvements.

The Pennsylvania Power Company, Ellwood, Pa., has completed arrangements for equipping its station with a steam turbine generating unit.

The Portland, Baker City & Butte Electric Railroad Company, Portland, Ore., is arranging to build an electric railroad 6 miles long between Portland and Butte. The enterprise involves the erection of an 8000-hp. steam plant in Portland to supply part of the current required. C. D. Charles is general manager of the company, which has a capital stock of \$2,000,000 and a bond issue of \$4,000,000 authorized.

Replacements of boilers, pumps, &c., for its water works system are contemplated by the city of Bessemer, Mich., but the types to be used have not yet been decided upon.

The Pacific Electric Engineering Company, Portland, Ore., has secured a contract from the Western Light & Power Company, Washougal, Wash., for the installation of an electric light plant, to be ready for operation by September 1. C. W. Cottrell is interested in the new company.

Plans for a large hydraulic power plant are being put into execution by the Washington Mining & Developing Company, Nooksack, Wash.

Having been granted a 20-year franchise by the city of Fairmont, Neb., T. J. Bender is having plans and specifications prepared for an electric light plant, to cost between \$8000 and \$10,000, upon which work will be commenced in the near future.

James E. McNary, Pittsburgh, sales agent of the Filer & Stowell Company, Milwaukee, was recently awarded a contract for a 22 and 38 x 42 in. cross compound condensing engine, for direct connection to a 600-kw. direct current General Electric generator, to be installed in the Southern Cambria Railway Company's plant at Johnstown, Pa.

Bridges and Buildings.

The Herzog Iron Works, St. Paul, Minn., has secured contract for the structural iron and steel to be used in the additions at the State Fair Grounds.

The A. E. Holmes & Bro. Company, Superior, Wis., has awarded the Barnett & Record Company a contract for a two-story building to be used in the fabrication of iron and other metal for roofing, sheathing, siding, &c.

Fires.

The plant of the Reid Foundry & Machinery Company, Ingersoll, Ind., was burned May 19, the loss being about \$10,000.

The plant of the Memphis Cotton Seed Oil Company, Memphis, Tenn., was destroyed by fire May 19, the loss being about \$100,000.

The plant of the John Robertson Company, Montreal, Canada, manufacturer of plumbers' supplies, was burned May 22. The loss is placed at \$100,000.

The plant of the People's Ice & Cold Storage Company, Kansas City, Mo., was damaged \$100,000 by fire May 24.

Hardware.

The Chamberlain Weatherstrip Company, Detroit, Mich., will erect a four-story and basement factory.

The Eastman-Kodak Company, Rochester, N. Y., has awarded contract to the Ferro-Concrete Construction Company, Cincinnati, Ohio, for the erection of a three-story steel and concrete building, 330 x 350 ft. This building will give the company a total floor space of 27½ acres. Work on the new building will be started at once.

Miscellaneous.

On May 4 the citizens of Kansas City, Kan., voted bonds for the purpose of purchasing the privately owned plant of the Metropolitan Water Company; the sum provided includes \$400,000 for improvements, which will be undertaken as soon as the transfer is effected. J. E. Smyth is city clerk.

The Ft. Atkinson (Wis.) Gas Company has decided upon plans for a new plant, including the construction of a steel reservoir.

The Cloos Safety Appliance Company, Milwaukee, Wis., has been formed for the manufacture of automatic elevator safety devices.

The Kosmos Electric Runabout Company is negotiating for the removal of its factory from New York to Detroit, Mich., but it is likely that no definite action to this end will be taken until fall. The machines which the company will manufacture include three different styles of electric vehicles, among which is the Kos Mos electric road chair.

The Standard Brick Mfg. Company, Evansville, Ind., is adding to its motor equipment.

The Fairfield Gas & Electric Company, Fairfield, Iowa, has decided to thoroughly equip and modernize its plant, to accomplish which will require an expenditure of \$20,000. The company recently completed a gas tank of 30,000 cu. ft. capacity.

A new dock for iron ore is to be built at Two Harbors, Minn., by the Alger-Smith Company.

The Pittsburgh Metallic Lath Company, Tarentum, Pa., has purchased a site on the Allegheny Valley Railroad at Arnold Station and will construct its plant there. The main building will be 200 x 312 ft.

The Standard Nipple & Tool Company, West Newton, Pa., has been organized with a capital stock of \$100,000. The company will occupy the old plant of the Standard Stove & Range Company and will equip it with machinery which will be moved from Pittsburgh, where the company has been operating for several years. W. A. Landsperger, West Newton, is interested.

To take care of a rapid increase in consumption of gas for domestic fuel, the Monterey County Gas & Electric Company, Monterey, Cal., has awarded to the California Light & Fuel Company a contract for the installation of a Lowe process crude oil generator and accessories, together with the work of rearranging the existing gas plant. The same company has also contracted for two Babcock & Wilcox water tube boilers, of the vertical header type, each unit having a nominal rating of 392 hp. The construction of a transmission line to Salinas is under consideration.

It is stated that the Sterlingworth Railway Supply Company's plant at Easton, Pa., has been sold at receiver's sale to W. J. Kuebler for \$5000, subject to a mortgage of \$90,000. Mr. Kuebler, who was the receiver, is a heavy stockholder in the company, and is understood to have purchased the property on his own account.

The Waterman-Waterbury Company has been incorporated at Buffalo, N. Y., to manufacture ventilating systems by Peter L. Pease and J. R. Gothing, Buffalo, and J. L. Waterbury, Minneapolis, Minn.

The Cosmopolitan Engineering Company, Pittsburgh, Pa., which manufactures ornamental and structural iron, will move its plant to Uniontown, Pa., where a site has been secured on the Baltimore & Ohio Railroad opposite the McCrum-Howell radiator plant.

The United States Radiator Company, Dunkirk, N. Y., will erect an addition to its plant, which will be used for the manufacture of steam boilers.

The M. Gillis Wagon Company, Hughesville, Pa., will build a three-story factory for the manufacture of wagons.

The American Sterilizer Company, Erie, Pa., will erect and equip a two-story factory, of brick and steel construction, 100 x 125 ft.

The Crown Metal Construction Company, Jamestown, N. Y., has been incorporated with a capital stock of \$75,000 to manufacture metal furniture by David Lincoln, John Winnberg, Mar-

tin R. Nelson, Winfred E. Lindblad, John Carlson, Edward Johnson, Emil L. Holmes, Richard Thoren and David Hillstrom.

The manufacture of steel culverts has been entered into by F. J. Zila & Co., Hutchinson, Minn.

The Pittsburgh Motor Truck Company has been organized at Pittsburgh, with a capital stock of \$100,000, to manufacture motor delivery trucks. The company purchased a plant at Ithaca, N. Y., but it will be moved to the new town of Koppel, Pa., where a site has been secured and the buildings will be erected. P. C. Benedict is president.

The R. B. White Company, Corning, N. Y., has been incorporated at \$40,000, and will engage in the business of treating clay, ores and metals. The incorporators of the company are Roscoe B. White and Bert Morse of Painted Post, and Lyman K. Roloson of Corning.

The Logansport Radiator & Equipment Company, Logansport, Ind., has increased its capital stock from \$75,000 to \$150,000.

The Western Motor Works of Logansport, Ind., has under consideration a proposition by the Marion Commercial Club to establish a branch factory in Marion, Ind. F. B. Wilkinson is general manager.

The booking of an order by the Remy Electric Company, Anderson, Ind., for 30,000 high tension Remy magnetos from the Bulck Motor Company, in addition to several other orders ranging from 1000 to 10,000 for the season of 1910, makes necessary the erection of a number of new one-story buildings, of concrete, brick and steel. When they are completed the company's capacity will be 1000 high tension ignition magnetos per day.

Broken Rails in New York Show 50 Per Cent. Decline.

Last January, the New York Public Service Commission, second district, ordered all steam railroad companies to furnish reports of rails broken in service within the State. For purposes of comparison at corresponding periods of the year, two orders were issued, one covering the four months of December, 1907, and January, February and March, 1908, and the other requiring monthly reports from December 1, 1908. The information required for the earlier period included rail specifications adopted since June 1, 1907. Current reports are required to state whether any accident resulted from the break. As to each rail broken, the current reports also require a statement of its weight, whether manufactured by the Bessemer or open hearth process, year rolled, year laid, name of manufacturer, kind of break, whether due to a flaw or defect and condition of weather.

Reports are now complete for the corresponding month with unimportant exceptions. The total number of rail failures reported is 5746, of which 3917 are for the period from December 1, 1907, to April 1, 1908, and 1829 for the four months ending March 31, 1909. Comparison of some of the larger roads shows a material decrease as shown below:

	Four months. 1908.	Four months. 1909.
Erie	473	202
Buffalo, Rochester & Pittsburgh	206	102
Delaware & Hudson	500	162
Delaware, Lackawanna & Western	144	96
Lake Shore	354	93
New York Central & Hudson River	1,601	537
New York, Ontario & Western	80	49
Pennsylvania (not including Northern Central)	228	139

This is an average reduction of 50 per cent. and over. Of the 54 steam roads from which reports are received separately, only 32 report any rail failures, the rest reporting none occurring.

Of the 1829 rail failures during December, 1908, and January, February and March, 1909, only four resulted in accidents, all of these of freight trains. The use of open hearth rails to some extent is indicated by the fact that 75 failures of open hearth rails are reported.

The Philadelphia Section of the American Chemical Society held its regular meeting at the Engineers' Club in that city, on the evening of May 20. The following officers were elected to serve for the ensuing year: President, C. E. Vanderkleed, Philadelphia; vice-president, George C. Davis, Philadelphia; secretary and treasurer, F. E. Dodge, Norristown, Pa. Executive Committee, William C. Cornell, C. S. Brinton and A. Henwood, all of Philadelphia.

The Iron and Metal Trades

Betterment in the iron trade is more marked. For the time being the breadth of the buying movement and the improvement in prices that has come with it take precedence over the fact that for a long stretch the mills will be employed on business yielding very modest profits. The urgency with which some buyers are pressing for deliveries indicates the extent to which stocks were allowed to run down, also that some of the mills are not yet keyed up to the new pace. At the same time the tonnage placed in recent weeks in anticipation of wants, and with an intuition that bargain time was passing, was not small.

As bearing upon the fundamental question whether and to what extent consumption is increasing, the best indication is furnished by the rate of production of the blast furnaces of the United States Steel Corporation. That organization is now down to the lowest practicable limit in the matter of stocks of metal and the expansion in the consumption promptly forces the blowing in of additional furnaces. The Steel Corporation is now running 74.5 per cent. of its blast furnace capacity. The two Riverside blast furnaces and the steel works and pipe mills there have been ordered in. No. 8 furnace at South Chicago, which is built on radically new lines, from the point of view of American practice, was to start Tuesday, and another furnace at South Chicago is to follow. It is estimated that by the first week in June 80 per cent. of the pig iron capacity of the Steel Corporation will be in operation.

That the activity in steel has quite outrun that in foundry lines is evident from the preponderance of basic iron sales in the pig iron market. In Eastern territory the movement referred to last week has gone farther and a total of 125,000 tons of basic iron has now been taken by open hearth steel plants. The price has advanced from \$15 to \$15.50, delivered at eastern Pennsylvania mills, a good portion of the sales of the past week being at the latter figure. Some buyers are yet in the market, and it is also to be said that some important furnaces have taken little of the business thus far placed.

The foundry trade has not been affected by the stir in basic. Large buyers of foundry iron in New England and eastern New York and Pennsylvania have already supplied their wants for several months ahead, but smaller buyers in those sections have been rather active. Figures gathered by Cincinnati pig iron interests showing 1,300,000 tons of iron at furnaces and the indications that foundry iron production is in excess of consumption explain the irregularity of prices in Central Western markets. In Bessemer iron a sale of 10,000 tons is reported to a steel company, which has also secured 20,000 tons from another steel interest.

A leading independent tin plate producer has closed for its requirements of sheet bars for the rest of the year at about \$24, Pittsburgh. Several leading makers of sheet bars are sold up for two or three months. Offers of open hearth billets below \$23, Pittsburgh, are reported.

Railroad buying improves slowly. Rail orders of the week include 26,000 tons for the Santa Fe, 5000 tons for the Northern Pacific, and 10,000 tons for the Chicago & Northwestern. May brought a larger total to the books of the rail mills than has been closed in many months. Chicago reports an order of 24,000 tons of plates and shapes for cars, and Pittsburgh District steel car plants are running at 50 per cent. of capacity.

Fabricating prices have stiffened somewhat. Business in bridges and buildings for the month so far is close to 200,000 tons. Among the larger contracts pending are 13,500 tons for the Missouri River bridge at Kansas City and 9500 tons for the new Post Office at the Pennsylvania Terminal in New York.

In the lighter lines mills are well employed. Some irregularity appears in the sheet market. Bar mills are increasing their output. An attempt to bring together some of the bar iron interests of the East is in the preliminary stage.

Melting steel has been active in the Pittsburgh and Chicago districts and prices have advanced.

A significant announcement is that on June 1 three steel companies and an important Shenango Valley furnace interest will restore the 10 per cent. taken from the wages of their employees April 1.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,
Declines in Italics.

At date, one week, one month and one year previous.

May 26, May 19, Apr. 28, May 27,
1909. 1909. 1909. 1908.

PIG IRON, Per Gross Ton:

Foundry No. 2, standard, Philadelphia	\$16.25	\$16.00	\$16.00	\$16.75
Foundry No. 2, Southern, Cincinnati	14.50	14.50	14.25	14.75
Foundry No. 2, local, Chicago ..	16.50	16.50	16.50	17.60
Basic, delivered, eastern Pa.	15.50	15.00	15.00	16.00
Basic, Valley furnace	14.25	14.00	14.00	15.25
Bessemer, Pittsburgh	15.90	15.90	15.65	16.90
Gray forge, Pittsburgh	14.40	14.40	14.40	14.90
Lake Superior charcoal, Chicago	19.50	19.50	19.50	20.00

BILLETS, &c., Per Gross Ton:

Steel billets, Pittsburgh	23.00	23.00	23.00	28.00
Forging billets, Pittsburgh	25.00	25.00	25.00	30.00
Open hearth billets, Philadelphia	24.50	24.50	25.40	29.20
Wire rods, Pittsburgh	29.00	29.00	29.00	35.00
Steel rails, heavy, at mill	28.00	28.00	28.00	28.00

OLD MATERIAL, Per Gross Ton:

Steel rails, melting, Chicago ..	14.25	14.00	13.50	12.00
Steel rails, melting, Philadelphia	15.25	15.25	14.00	13.00
Iron rails, Chicago	17.00	16.50	16.50	15.00
Iron rails, Philadelphia	18.50	18.00	17.00	18.00
Car wheels, Chicago	15.00	14.75	14.50	13.00
Car wheels, Philadelphia	15.00	15.00	14.00	14.00
Heavy steel scrap, Pittsburgh ..	15.50	15.25	14.25	13.00
Heavy steel scrap, Chicago	14.00	13.75	12.75	11.00
Heavy steel scrap, Philadelphia	15.25	15.25	13.50	13.00

FINISHED IRON AND STEEL,

Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined iron bars, Philadelphia ..	1.40	1.40	1.35	1.45
Common iron bars, Chicago	1.30	1.30	1.25	1.65
Common iron bars, Pittsburgh ..	1.30	1.30	1.30	1.50
Steel bars, tidewater, New York	1.36	1.36	1.31	1.76
Steel bars, Pittsburgh	1.20	1.20	1.15	1.60
Tank plates, tidewater, New York	1.46	1.46	1.41	1.86
Tank plates, Pittsburgh	1.30	1.30	1.25	1.70
Beams, tidewater, New York	1.46	1.46	1.41	1.86
Beams, Pittsburgh	1.30	1.30	1.25	1.70
Angles, tidewater, New York	1.46	1.46	1.41	1.86
Angles, Pittsburgh	1.30	1.30	1.25	1.70
Skelp, grooved steel, Pittsburgh	1.30	1.30	1.20	1.55
Skelp, sheared steel, Pittsburgh	1.40	1.40	1.30	1.65

SHEETS, NAILS AND WIRE,

Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.20	2.20	2.20	2.50
Wire nails, Pittsburgh	1.70	1.70	1.80	2.05
Cut nails, Pittsburgh	1.65	1.65	1.70	1.85
Barb wire, galv., Pittsburgh	2.00	2.00	2.25	2.50

METALS, Per Pound:

	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	13.50	13.25	12.87½	12.87½
Electrolytic copper, New York ..	13.25	13.00	12.62½	12.62½
Spelter, New York	5.20	5.15	5.02½	4.55
Spelter, St. Louis	5.05	5.00	4.95	4.40
Lead, New York	4.40	4.35	4.25	4.35
Lead, St. Louis	4.30	4.30	4.15	4.20
Tin, New York	29.15	28.80	29.25	28.50
Antimony, Hallett, New York	7.75	7.75	7.75	8.50
Nickel, New York	45.00	45.00	45.00	45.00
Tin plate, 100 lb., New York	\$3.64	\$3.64	\$3.64	\$3.89

Prices of Finished Iron and Steel F.O.B. Pittsburgh.

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural steels and sheets, No. 11 and heavier, 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Structural Shapes.—I-beams and channels, 3 to 15 in., inclusive, 1.30c., net; I-beams over 15 in., 1.35c., net; H-beams over 8 in., 1.45c.; angles, 3 to 6 in., inclusive, ¼ in. and up, 1.30c., net; angles, over 6 in., 1.35c., net; angles, 3 x 3 in. and up, less than ¼ in., 1.45c., base, half extras, steel bar card; tees, 3 in. and up, 1.30c., net; tees, 3 in. and up, 1.30c., net; angles, channels and tees, under 3 in., 1.20c., base, plus 10c. half extras, steel bar card; deck beams and bulb angles, 1.60c., net; hand rail tees, 2.70c., net; checkered and corrugated plates, 2.70c., net.

Plates.—Tank plates, ¾ in. thick, 6¼ in. up to 100 in. wide, 1.30c., base. Extras over this price, are as follows:

Tank, ship and bridge quality, ¼-in. thick on edges, 100 in. wide, down to but not including 6 in. wide, is taken as base.

Steel plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, shall be considered $\frac{1}{4}$ -in. plate. Steel plates over 72 in. wide must be ordered $\frac{1}{4}$ -in. thick on edge, or not less than 11 lb. per square foot, to take base price. Steel plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. shall take the place of 3-16-in.

Percentages as to overweight on plates, whether ordered to gauge or weight, to be governed by the Association of American Steel Manufacturers' Standard Specifications.

Gauges under $\frac{1}{4}$ -in. to and including 3-16-in. plates on thin edges.....	\$0.10
Gauges under 3-16-in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
All sketches (excepting straight taper plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.).....	.10
Complete circles.....	.20
Boiler and flange steel plates.....	.10
"A. B. M. A." and ordinary firebox steel plates.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive firebox steel.....	.50
Shell grade of steel is abandoned.	
For widths over 100 in. up to 110 in.....	.05
For widths over 110 in. up to 115 in.....	.10
For widths over 115 in. up to 120 in.....	.15
For widths over 120 in. up to 125 in.....	.25
For widths over 125 in. up to 130 in.....	.50
For widths over 130 in.....	1.00

TERMS.—Net cash 30 days. Pacific Coast base, 1.30c. f.o.b. Pittsburgh.

Sheets.—Minimum prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows: Blue annealed sheets, No. 10 and heavier, 1.65c.; Nos. 11 and 12, 1.70c.; Nos. 13 and 14, 1.75c.; Nos. 15 and 16, 2.05c. Box annealed sheets, Nos. 17 to 21, 2c.; Nos. 22 to 24, 2.05c.; Nos. 25 and 26, 2.10c.; No. 27, 2.15c.; No. 28, 2.20c.; No. 29, 2.25c.; No. 30, 2.35c. Galvanized sheets, Nos. 13 and 14, 2.30c.; Nos. 15 and 16, 2.40c.; Nos. 17 to 21, 2.50c.; Nos. 22 to 24, 2.65c.; Nos. 25 and 26, 2.85c.; No. 27, 3.05c.; No. 28, 3.25c.; No. 29, 3.35c.; No. 30, 3.60c. Painted roofing sheets, No. 28, 1.55c. per square. Galvanized roofing sheets, No. 28, 2.80c. per square for $\frac{1}{2}$ -in. corrugations.

Wrought Pipe.—Discounts on steel pipe, $\frac{3}{4}$ to 6 in., in carloads to the largest trade, are 81 and 5 per cent. off list, and on iron pipe, $\frac{1}{2}$ to 8 in., are 78 and 5 per cent. off list.

Boiler Tubes.—Regular discounts are as follows:

Boiler Tubes.	Steel.
1 to $1\frac{1}{4}$ in.....	.50
$1\frac{1}{4}$ to $2\frac{1}{4}$ in.....	.62
$2\frac{1}{4}$ to 5 in.....	.70
$2\frac{1}{2}$ in.....	.64
6 to 13 in.....	.62
$2\frac{1}{2}$ in. and smaller, over 18 ft. long, 10 per cent. net extra.	
$2\frac{1}{2}$ in. and larger, over 22 ft. long, 10 per cent. net extra.	

Wire Rods.—Bessemer rods, \$29; chain rods, \$29; basic rods, \$29 to \$30.

Chicago.

FISHER BUILDING, May 26, 1909.—(By Telegraph.)

A steadily rising volume of business in finished lines of iron and steel is coming to the mills, which with rare exceptions are all running fuller than they were a month ago and very much nearer normal capacity than at any time since 1907. The phase of recent developments of most significant interest in this direction concerns railroad purchases, which are notably larger and more broadly extended. A late order for 26,000 tons of 90-lb. open hearth rails received by the Illinois Steel Company from the Santa Fé Railroad raises the tonnage taken so far in May by this steel company to 166,000 tons. This, together with other open hearth specifications recently received, assures the continued operation of the Gary mill at its present gait of about 20 per cent. of capacity for several weeks ahead. Urgency for early deliveries on the Santa Fé order may, however, require a higher rate of output. New car construction is also calling for heavier purchases of plates, structural shapes and bars. It is worthy of note that in one such order just placed, amounting to 24,000 tons, specifications were furnished for a large part of the entire tonnage. Among the late orders taken by car shops is one for 500 refrigerator cars given by the Great Northern Railway to the American Car & Foundry Company. Fifteen of the 21 blast furnaces in the several plants of the Illinois Steel Company, exclusive of Gary, are in operation, and another one is to be blown in at the South Works this week. This represents 85 per cent. of full capacity. Since the company converts all of its pig iron into steel, the percentage of active blast furnace capacity is practically identical with that of the steel making and finishing departments. Orders for structural material are pouring in, and the local mills are crowded with work. Sales agencies representing some of the Eastern mills are declining to figure on plates and shapes where immediate delivery is required. A local fabricator is in the market for 25,000 tons of material for delivery through the remainder of the year. Prices of finished products are gradually firming up, but there is still some shading in sheets and occasionally in plates and shapes.

Pig Iron.—The market has drifted into another period of comparative inaction. There is little buying except in

small lots for current demands, and even these are not numerous. Shipments against contracts already placed are coming forward promptly. The attitude of furnacemen respecting prices remains unchanged. On shipments through the last half \$11.50, Birmingham, for No. 2 foundry is the schedule adhered to by leading Southern producers. The desire to realize on surplus stocks is responsible in a few cases for the naming of \$11 for May and June shipments, but such concessions do not extend to deliveries beyond that time. A Milwaukee manufacturer is asking prices on 1000 tons of low grade iron for last half delivery. There are some indications of growing activity among the foundries making railroad castings which it is expected will before long bring out a better demand for malleable iron, of which these foundries are large users. The American Car & Foundry Company is reported to have purchased at Detroit a tonnage of malleable iron required for the construction of 3000 cars. There are more inquiries of this character in the market than for some time. It is expected that by June 15 the entire available blast furnace capacity of the Illinois Steel Company will be in operation with the exception of two stacks at the North Works which are not likely to be ever blown in again. No. 9 furnace at the Gary Works is completed and ready for service when required. Stacks Nos. 10, 11 and 12 are in blast. Nos. 5, 6, 7 and 8 are under construction, but will not be included in the active list for some months. The following quotations are for May and June delivery, f.o.b. Chicago:

Lake Superior charcoal.....	\$19.50 to \$20.00
Northern coke foundry, No. 1.....	17.00 to 17.50
Northern coke foundry, No. 2.....	16.50 to 17.00
Northern coke foundry, No. 3.....	16.00 to 16.50
Northern Scotch, No. 1.....	17.50 to 18.00
Southern coke, No. 1.....	16.35 to 16.85
Southern coke, No. 2.....	15.85 to 16.35
Southern coke, No. 3.....	15.35 to 15.85
Southern coke, No. 4.....	14.85 to 15.35
Southern coke, No. 1 soft.....	16.35 to 16.85
Southern coke, No. 2 soft.....	15.85 to 16.35
Southern gray forge.....	14.35 to 14.85
Southern mottled.....	14.10 to 14.60
Malleable Bessemer.....	16.50 to 17.00
Standard Bessemer.....	17.40 to 17.90
Jackson Co. and Kentucky silvery, 6 %.....	19.90 to 20.40
Jackson Co. and Kentucky silvery, 8 %.....	20.90 to 21.40
Jackson Co. and Kentucky silvery, 10 %.....	21.90 to 22.40

(By Mail.)

Billets and Rods.—On current orders for small lots of forging billets the market is firm at \$26, Chicago. A contract for 500 tons placed last week by a Milwaukee manufacturer for deliveries extending through the last half is understood to have been placed at a shade under this price. An inquiry for another lot of 90 tons is reported. At least two Eastern mills, ordinarily a factor in this market, have no surplus steel to offer, and are declining to quote. The late advance of \$2 a ton in wire products was likewise effective upon wire rods, which are now quoted upon this basis under "f.o.b. Pittsburgh" prices.

Rails and Track Supplies.—The Illinois Steel Company has received an order for another lot of 5000 tons of open hearth rails for the Northern Pacific and an order for 10,000 tons for a leading Western line. Besides the large tonnage of heavy rails purchased and still pending, there is a marked increase in the inquiries from traction lines and small steam roads from which some very desirable business is expected to result. Specifications against the liberal contracts for track fastenings placed earlier in the season are being supplied in fairly satisfactory volume. A few orders for light rails have been secured at the new prices, which represent the schedule of practically all the leading mills. The prospects for the maintenance of this schedule are improved by the higher prices and advancing tendency of re-rolling steel rails. The prices comprising the new schedule are as follows: 40 to 45 lb. sections, \$26; 30 to 35 lb. sections, \$26.75; 16, 20 and 25 lb. sections, \$27; 12 lb. sections, \$28, Chicago, less 50c. a ton on lots under 500 tons and \$1 a ton on lots over 500 tons.

Structural Material.—The large tonnage of plain material coming out is rapidly filling structural mill capacities. Deliveries, in fact, are already beginning to fall in arrears. Most of the fabricating shops have also booked business enough to keep them reasonably busy for some time ahead. As a result there is less aggressiveness in competition, and prices are gradually firming up. The transactions of the past week, although fairly numerous, include but little individual quantities of notable size. The Minneapolis Steel & Machinery Company secured a contract for 300 tons let by Adolph C. Coors, Denver, Colo., for the construction of a bottling plant. The Chamberlain Building, Chicago, on which bids for 1180 tons are being taken, is still pending. Another project on which figures are about to be submitted are the Brandes theater and office building, Omaha, Neb., calling for about 1500 tons, and an addition to the Hotel Pontchartrain, Detroit, Mich., requiring about 1300 tons. Early letting of the 13,500 tons to be used in the construction of a Missouri River bridge at Kansas City is looked for, and in addition to this there is under consideration 15,700 tons for two bridge structures, at Portland, Ore., one a railroad and the other a highway bridge. The market on

shapes is fairly even, at 1.30c., Pittsburgh, or 1.45c., Chicago, the latter price applying especially to shipments from local mills.

Plates.—The demand for plates is becoming more general and less dependent upon structural fabricating requirements. Some good sized orders have been placed by car and car equipment shops. An order from a local equipment concern taken by the leading interest included 24,000 tons of plates and shapes, the latter comprising about half of the tonnage. Plate orders from the boiler and tank shops are more frequent, and specifications from all sources make up a liberal aggregate. We quote 1.45c., Chicago, as representing the general market, which, however, is still subject to shading of perhaps \$1 a ton in some instances on specific tonnage; yet, as a whole, the market is unquestionably firmer.

Sheets.—Continued improvement in the demand for sheets is noted, but the business is not as evenly distributed among the various mills as it might be. Some are well filled and even behind with shipments, while others are running comparatively light. There is still more or less shading of prices, the tendency in this respect being especially pronounced in the Southwest. Concessions of \$1 a ton and even more are reported. Black sheets are seemingly firmer than galvanized sheets, but if spelter continues to advance it is likely to have a strengthening effect upon the latter.

Bars.—As compared with the recent activity in steel bars, which resulted in the closure of contracts covering a large portion of requirements for the remainder of the year and some beyond, but little new business is being entered. Specifications against contracts are running higher in tonnage than for some time. Prices are firm at 1.35c., Chicago, on the business now being taken. Several good inquiries for bar iron have been received from the railroads. One lot of 2000 tons for a Western line is reported to have been closed, while a considerable tonnage from two other roads is pending. A somewhat firmer feeling has developed, and the mills are now asking 1.30c., Chicago, for bar iron, but on orders of desirable size and specifications this price could likely be shaded.

Merchant Pipe.—With only a slight degree of improvement noted in the actual orders taken, betterment in the demand for merchant pipe is still to a large extent prospective. There is not much buying except for nearby requirements. Jobbers are not disposed to stock up heavily, being content to depend upon prompt mill shipments for replenishment, as long as they are available. Prices continue unchanged.

Boiler Tubes.—There is a slightly better demand for merchant tubes, but outside of moderate specifications from jobbers new orders are still confined to small lots to supply the immediate needs of consumers. Locomotive tubes are likewise moving slowly. Some shading of regular discounts is reported.

Merchant Steel.—A large portion of the estimated requirements of implement makers has been taken care of by contracts covering a period from July 1, and specifications are now coming in freely. Included in this is a fair amount of agricultural shafting, and while the general volume of business in line shafting is somewhat larger, regular discounts, though less uneven, are not being absolutely maintained.

Cast Iron Pipe.—Only two small lettings are reported. One of 300 tons was awarded by Halstead, Kan., and another of 100 tons by Miamiasburg, Ohio, the latter being secured by the Dimmick Pipe Company. Except for the demand comprising incidental orders being placed, there is little new business of importance in sight. Heavy shipments, however, are going forward from the foundries.

Metals.—The increasing demand for copper, lead and spelter indicates growing activity in the industries using these metals. The improvement noted in last report is this week emphasized by a still larger volume of business, and further slight advances in ingot copper, lead and spelter. While prices of old metals have not hardened appreciably, the market is supported by a more generous demand, and as in new metals prices show a constantly broadening tendency. Quotations are as follows: Casting Copper, 13 $\frac{1}{2}$ c. to 13 $\frac{3}{4}$ c.; lake, 13 $\frac{1}{2}$ c. to 13 $\frac{3}{4}$ c., in car lots, for prompt shipment; small lots, $\frac{1}{4}$ c. to $\frac{1}{2}$ c. higher; pig tin, car lots, 31c.; small lots, 33c.; lead, desilverized, 4.45c. to 4.55c., for 50-ton lots; corroding, 4.70c. to 4.80c., for 50-ton lots; in car lots, 2 $\frac{1}{4}$ c. per 100 lb. higher; spelter, 5.25c. to 5.35c.; Cookson's antimony, 10 $\frac{1}{2}$ c., and other grades, 9 $\frac{1}{4}$ c. to 10 $\frac{1}{4}$ c.; sheet zinc is \$6.75, f.o.b. La Salle, in car lots of 600-lb. casks. On old metals we quote: Copper wire, crucible shapes, 13 $\frac{1}{4}$ c.; copper bottoms, 11 $\frac{1}{2}$ c.; copper clips, 12c.; red brass, 11 $\frac{1}{4}$ c.; yellow brass, 9 $\frac{1}{2}$ c.; light brass, 7c.; lead pipe, 4 $\frac{1}{4}$ c.; zinc, 4.75c.; pewter, No. 1, 21c.; tin foil, 23c.; block tin pipe, 26c.

Old Material.—While the rumor of an intended purchase of large tonnage has not been realized, the market has been definitely strengthened by a steadily expanding demand from all consumers. This has gradually widened until it has

fairly overreached the current supply. This is especially true of the melting steel grades, which continue to lead the market in its upward course. Railroads are undoubtedly holding back a very large tonnage, as it is known that the lists offered from week to week include only a small portion of their accumulated stocks. The strength of the market was fairly demonstrated in the prices obtained on a list of 4000 tons closed last week by the Illinois Central, in which the items were divided into small lots not exceeding a few hundred tons each. Re-rolling steel rails brought \$15.50, and frogs, switches and guards, cut apart, \$14, all per gross ton; railroad malleable, \$12.75; springs, knuckles and couplers, \$13; pipes and flues, \$10.25, all per net ton connecting lines. Through a typographical error, prices applying to the first section of old material quotations has in the four preceding issues been made to read per net ton instead of per gross ton. Correction is herewith made, and the following prices are per gross ton, f.o.b. Chicago:

Old iron rails.....	\$17.00 to \$17.50
Old steel rails, re-rolling.....	15.00 to 15.50
Old steel rails, less than 3 ft.....	14.25 to 14.75
Relaying rails, standard sections, subject to inspection.....	22.50 to 23.50
Old car wheels.....	15.00 to 15.50
Heavy melting steel scrap.....	14.00 to 14.50
Frogs, switches and guards, cut apart.....	14.00 to 14.50
Mixed steel.....	11.00 to 11.50

The following quotations are per net ton:

Iron fish plates.....	\$16.50 to \$17.00
Iron car axles.....	18.25 to 18.75
Steel car axles.....	16.75 to 18.25
No. 1 railroad wrought.....	13.00 to 13.50
No. 2 railroad wrought.....	12.00 to 12.50
Springs, knuckles and couplers.....	13.00 to 13.50
Locomotive tires, smooth.....	14.00 to 14.50
No. 1 dealers' forge.....	10.00 to 11.00
Mixed bushing.....	8.00 to 8.50
Steel axle turnings.....	8.00 to 8.50
Machine shop turnings.....	7.00 to 7.50
Cast borings.....	5.75 to 6.25
Mixed borings, &c.....	5.00 to 6.00
No. 1 mill.....	7.00 to 7.50
No. 2 mill.....	6.00 to 6.50
No. 1 boilers, cut to sheets and rings.....	9.50 to 10.00
No. 1 cast scrap.....	14.00 to 14.50
Stove plate and light cast scrap.....	11.75 to 12.25
Railroad malleable.....	12.75 to 13.25
Agricultural malleable.....	11.25 to 11.75
Pipes and flues.....	10.00 to 10.50

Philadelphia.

PHILADELPHIA, Pa., May 25, 1909.

A pronounced stronger tone is to be noted in the market for both crude and finished materials. There has been further buying of pig iron in moderate lots at higher prices, and some classes of finished material show more movement and in better quantities. Finished material prices have not advanced, but are decidedly firmer, sellers refusing to take orders for extended forward delivery at the present levels. An absence of further cutting is also to be noted. The situation on the whole has a healthier appearance, and, while there has been a certain amount of speculative buying, there is undoubtedly an increase in consumption in a number of directions. As many of the large consumers have now covered for their near future wants, a diminution in buying is expected, although there will no doubt be sufficient business, particularly on the part of the smaller consumers, to maintain the present strength of the market. Old material continues to advance on small sales; holders of the leading grades are adding to their stock, and in many cases refuse to part with any tonnage at the prevailing prices.

Pig Iron.—There has been a further heavy movement in basic iron. Steelmakers in this territory placed orders during the week for some 40,000 tons, mostly for third quarter shipment, at \$15.50, delivered. On the present buying movement at least 125,000 tons of basic iron have been sold, and quite a round tonnage is still pending. While there has been some inquiry for this grade for delivery over the last half of the year, very little has been sold for shipment beyond October, while, on the greater proportion, deliveries begin at once and extend over three and four months. Sellers are now pretty well satisfied with the business taken and are withdrawing to some extent from the market. While the majority of the large buyers of foundry iron have covered for their near future needs, hardening prices have caused the smaller consumers to enter the market with a rush, and a large volume of business, a considerable portion of which has been at advanced prices, has been placed during the week. Several melters have closed for 1000-ton lots of mixed grades. One round tonnage of coke malleable is reported at \$17, delivered, while several moderate lots of charcoal iron have been sold. Sellers of low grade irons have advanced asking prices, \$15.25 to \$15.50, delivered, being quoted for these grades, although no tonnage has been taken. Virginia foundry irons have been in pretty fair demand; individual sales have not been large, but in the aggregate reach quite a good total. Prices on these grades continue very firm. Forge iron is in somewhat better demand and prices show an advance, the available low priced iron having been pretty well cleaned up. No movement in low phosphorus iron is reported. The

Eastern Pig Iron Association, which held its regular meeting last week, reports a material improvement in the situation. Orders during the month show an increase of over 100,000 tons above those for the previous month, while stocks on hand were stationary. Heavy shipments on orders recently taken will, however, result in a material decrease in stocks during the present month. Sellers, as a rule, are more optimistic regarding the situation, and while there has been some speculative buying, a large share of the tonnage recently taken was actually needed for business in consumers' hands, and it is quite evident that there has been an increase in the quantity of pig iron melted. The market is moving forward steadily, and while it is believed that there will be less active buying in the near future, it is thought that sufficient purchases will be made to maintain the present strength of the market. Prices show an advance in nearly all grades; some sellers ask an advance of 25c. for third quarter and 50c. for fourth quarter delivery, dependent on grade and quantity. For prompt shipment the following quotations are named for delivery in buyers' yards, eastern Pennsylvania and nearby points:

Eastern Pennsylvania, No. 2 X foundry.....	\$16.25 to \$16.50
Eastern Pennsylvania, No. 2 plain.....	15.75 to 16.00
Virginia, No. 2 X foundry.....	16.50 to 16.75
Virginia, No. 2 plain.....	16.25 to 16.50
Gray forge.....	15.00 to 15.25
Basic.....	15.50
Low phosphorus.....	19.50 to 20.00

Ferromanganese.—A better demand is noted, a number of inquiries having come out for deliveries over the second half of the year. Sales of moderate lots for early delivery are reported, and the market has taken on a somewhat stronger tone. For prompt delivery \$40.50 to \$41, Baltimore, is named, with some sellers asking \$1 advance for extended shipment.

Billets.—While consumers show more interest in the market and would place orders for extended delivery, sellers maintain prices and refuse to entertain offers for large lots or for extended deliveries at the present levels. Buying, therefore, is principally in small lots for prompt shipment. Ordinary rolling billets command \$24.50 for deliveries in this territory, forging billets taking the usual \$2 advance, the customary extras applying for high carbons and special sizes.

Plates.—Orders are coming out a little more freely and quantities are larger. Several 500-ton lots of locomotive steel have been taken by Eastern mills, and fair sales of bridge and tank plates are also reported. There is a decided improvement in the demand for ship plates, some 15,000 to 20,000 tons being figured on. The demand is broadening, and a better view of conditions is taken by mills in this territory. Prices are stronger and there is less disposition to shade quotations, which, for deliveries in this territory, are 1.45c. to 1.55c., the usual extras applying.

Structural Material.—No further large contracts have been placed, although several small building propositions covering a few hundred tons each have been closed by fabricators. The Philadelphia & Reading Railway is asking for further proposals for its elevated work, but the quantity is not yet announced. A fair run of miscellaneous business is reported, and plain material for delivery in this territory is firmly maintained at 1.45c. to 1.55c., according to specification.

Sheets.—There has been a better demand for sheets, and mills in this vicinity are operating pretty close to full capacity. Transactions, however, continue of a day to day character, mills not accepting contracts for tonnage which buyers would place at the present prices. The general demand shows improvement, and prices are firmly maintained as follows for deliveries in this vicinity: Nos. 18 to 20, 2.40c.; Nos. 22 to 24, 2.50c.; Nos. 25 and 26, 2.60c.; No. 27, 2.70c.; No. 28, 2.80c.

Bars.—While there is a better demand, sellers are not inclined to book large orders or take tonnage for extended delivery at the ruling prices. The bulk of the business done is of a prompt nature. Reports of a closer association of the Eastern bar iron makers are again being heard, particularly through the efforts of a New York attorney, but nothing definite is believed to have developed as yet. Prices, while no higher, are firmer, and for delivery in this territory steel bars are quoted at 1.35c.; refined iron bars, 1.40c. to 1.50c., and common iron bars, 1.35c. to 1.40c.

Coke.—A better movement is noted. Sales of round lots of furnace coke for delivery over the last half of the year at \$1.60, at oven, are reported, while several moderate lots of foundry coke for forward delivery, at \$2.15, at oven, have been sold. Spot coke, however, is still weak. For delivery in this territory prices range about as follows:

Connellsville furnace coke.....	\$3.85 to \$4.10
Foundry coke.....	4.15 to 4.50
Mountain furnace coke.....	3.40 to 3.70
Foundry coke.....	3.70 to 4.10

Old Material.—Prices on nearly all grades continue to advance. Sales, however, have been rather light, as sellers show but little disposition to dispose of their holdings on an advancing market. Several moderate lots of heavy melting

steel have been taken at ruling prices, while rolling mills are picking up small lots of the various grades of material, but are unable to get tonnage at present prices, which to a certain extent are still nominal, and range about as follows for delivery in buyers' yards in this territory:

No. 1 steel scrap and crops.....	\$15.25 to \$15.75
Low phosphorus.....	19.50 to 20.50
Old steel axles.....	20.00 to 20.50
Old iron axles.....	22.00 to 22.50
Old iron rails.....	18.50 to 19.00
Old car wheels.....	15.00 to 15.50
Choice No. 1 R. R. wrought.....	18.00 to 18.50
Machinery cast.....	15.00 to 15.50
Railroad malleable.....	14.00 to 14.50
Wrought iron pipe.....	15.25 to 15.75
No. 1 forge fire scrap.....	13.00 to 13.50
No. 2 light iron.....	9.00 to 9.50
Wrought turnings.....	12.50 to 13.00
Stove plate.....	11.75 to 12.25
Cast borings.....	10.50 to 11.00
Grate bars.....	13.25 to 13.75

The E. B. Leaf Company has taken over the business of E. B. Leaf & Co., which will be continued at 1241 Real Estate Trust Building, Philadelphia. E. B. Leaf is president; G. Herbert Leaf, treasurer; John Ernest Allen, secretary, and Jacob Rech, Jr., assistant treasurer.

Pittsburgh.

PARK BUILDING, May 26, 1909.—(By Telegraph.)

Pig Iron.—Inquiries are fairly plentiful, and prices seem to be firm. The Westinghouse Air Brake Company has bought about 500 tons of Bessemer at about \$14.75, and an equal lot of gray forge at \$13.60, both at Valley furnace. A local interest is in the market for 500 tons of Bessemer for reasonably prompt shipment. The Republic Iron & Steel Company has bought from the Shenango Furnace Company 10,000 tons of standard Bessemer for delivery over the next two or three months, and has arranged with a nearby steel plant for upward of 20,000 tons of Bessemer, to be returned when it is needed. The Republic Company is operating all of its six furnaces in the valleys, but is running short of iron. We quote Bessemer at \$15; malleable Bessemer, \$14.50; No. 2 foundry, \$14.25 to \$14.50; basic, \$14.25, and gray forge, \$13.50 to \$13.60, all at Valley furnace, with a freight rate to Pittsburgh of 90c. a ton.

Steel.—The consumption of sheet and tin bars is much heavier than for many months, and several leading makers of bars are sold up for the next two or three months and are practically out of the market. A leading independent tin plate maker has closed with a local concern for its requirements of sheet and tin bars over the balance of this year on the basis of about \$24, Pittsburgh. We quote Bessemer and open hearth billets at \$23, but one leading interest is offering open hearth billets quite freely below that price and has made some sales. Sheet and tin bars are \$24 to \$25 and forging billets are \$25 to \$26.

Coke.—Large blast furnace interests at Wheeling, Youngstown, in the Chicago District and in the East have made heavy contracts for their supply of coke over the last half of the year. These contracts aggregate from 3000 to 4000 tons per day and were closed on the basis of about \$1.65, or, perhaps, slightly less, per net ton at oven.

(By Mail.)

The improved conditions in the steel trade that have developed in the last two or three months can best be appreciated when we state that deliveries being made by two or three of the leading steel companies have reached a condition that are not satisfactory to some customers. In finishing lines the Carnegie Steel Company is becoming congested with orders to some extent, and is operating to-day very close to 95 per cent. of its ingot capacity, which is 28,000 tons per day. This company recently started its Mingo Junction Steel Works, and one of the two blast furnaces at that plant, and expects to start the other furnace within a week or two, and is now shipping basic iron from the Edgar Thomson blast furnaces to the Mingo Works and also to the Homestead Works. All of the 11 Edgar Thomson furnaces are now in blast, the first time this has been the case for over 18 months. The Republic Iron & Steel Company is operating all of its nine blast furnaces and all of its finishing mills, including its Bessemer steel plant at Youngstown, to full capacity, and recently came in the market and bought 10,000 tons of Bessemer iron for its requirements in the Youngstown District. On June 1 the Republic Company will restore the 10 per cent. reduction in blast furnace labor, which went into effect on March 1. This company is filled up with orders for the next five or six weeks, and is entering large orders daily for its various lines of product. The Jones & Laughlin Steel Company is operating to practically full capacity, and on some of its finished lines is practically sold up for the balance of this year. Mills rolling sheet and tin plate, pipe and steel bars are operating to greater capacity than at any time for more than a year and a half, and while some in the trade believe there will be a recession in business in July or August, the whole trade is decidedly optimistic, and with good crops it

is believed that business will be very active in the fall months. Improvement in the scrap trade continues.

Ferromanganese.—This material continues weak and is being pretty freely offered at \$40.50 to \$41, seaboard, the freight to Pittsburgh being \$1.95 a ton. The steel interest that was in the market for 1000 tons has not yet closed.

Ferrosilicon.—The demand for this material has been active in the past two or three weeks, and it has been somewhat scarce, selling in one or two cases as high as \$70, Pittsburgh, for spot shipment. This, however, is above the market, and we quote 50 per cent. at \$62.50 to \$63, for shipment in the next month or two. We note sales of about 100 tons of 50 per cent. at \$62.25 and up to \$63.50, Pittsburgh, all material for shipment after the first week in June being sold with the duty on account of the buyer.

Rods.—The recent advance in the price of rods from \$27 to \$29 has checked the demand, but consumers covered very freely prior to the advance and are out of the market for the time being. We quote Bessemer and chain rods at \$29 and open hearth at \$29 to \$30, Pittsburgh.

Skelp.—The demand is better than for several months, and one local mill that rolls sheared iron plates has recently started up with a good deal of tonnage on its books. We quote grooved steel skelp at 1.30c. to 1.35c.; sheared, 1.40c. to 1.45c.; grooved iron, 1.50c. to 1.55c., and sheared iron skelp, 1.55c. to 1.60c., all for ordinary widths and gauges, f.o.b. Pittsburgh.

Steel Rails.—Little or nothing is doing in standard sections and no large contracts are in sight. The demand for light rails is active; in the past week the Carnegie Steel Company received domestic orders and specifications for 2618 tons and export orders for 1912 tons, or a total of 4530 tons. We quote standard sections at \$28, at mill, while prices on light rails are as follows: 12-lb., \$28; 16, 20 and 25 lb., \$27; 30 and 35 lb., \$26.75; 40 and 45 lb., \$26, all in 250-ton lots, f.o.b. Pittsburgh. Over 250 tons and up to 500 tons, 60c. a ton less, and over 500 tons \$1 a ton less.

Plates.—The mills are discouraging speculative buying as much as possible on the part of consumers, and insist that when the contracts are entered they must be accompanied by specifications. The mills want to avoid as much as possible loading up with orders for delivery ahead, believing that later in the year prices on plates will be better. The steel car companies are taking a fairly heavy tonnage of plates, the Standard Steel Car and Pressed Steel Car interests now operating to over 50 per cent. of capacity. The Newport News Shipbuilding Company is expected to close shortly for the material for three or four boats. The plates and shapes for these boats will probably go to Eastern mills. On the general run of orders, 1/4-in. and heavier, plates are being quoted at 1.30c., at mill, but on good orders 1.25c. is being done.

Structural Material.—A heavy tonnage is being placed and a great many inquiries are in the market. The Jones & Laughlin Steel Company has taken the Second National Bank Building in this city, 1000 tons, and about 900 tons for a high school at Wilkes-Barre, Pa., and is now making deliveries on 1500 tons of steel for a paper mill at Johnsonburg, Pa. The McClintic-Marshall Construction Company has taken about 3500 tons of bridge work for the Pennsylvania Lines and the American Bridge Company has taken a building for B. White on the North Side, 700 tons, and about 1000 tons for the West Penn Hospital. The leading structural interests are pretty well filled up with work and are inclined to be stiffer in their ideas as to prices. The general market on beams and channels up to 15 in. seems to be fairly strong at 1.30c., Pittsburgh.

Steel Bars.—Two of the leading producers, Republic and Cambria, are now quoting 1.25c. on steel bars, but Jones & Laughlin and Carnegie are still willing to enter actual orders at 1.20c., at mill. The Republic Iron & Steel Company is operating to full capacity all its mills that roll steel bars, and is said to be filled up for the next five or six weeks. Specifications against contracts continue to come in freely, and new orders are being entered right along. Mills rolling iron bars report a better demand, and the market seems to be stronger. We quote steel bars at 1.20c. to 1.25c., and iron bars at 1.30c. to 1.35c., at mill, Pittsburgh.

Tin Plate.—The McKeesport Tin Plate Company, which operates a tin mill at McKeesport, Pa., containing 10 hot and 10 cold mills, has decided to double its capacity and will build 10 more hot mills. It is believed that the 10 present stands of cold rolls will serve the 20 hot mills, and no more cold mills will be built at present. Contracts for these mills, together with buildings and other equipment, will be ready to place in a short time. The demand for tin plate is active and specifications against contracts continue to come in freely, most of the leading tin plate mills being operated to practically full capacity. We quote 100-lb. cokes at \$3.40, Pittsburgh.

Sheets.—While the demand for both black and galvanized sheets is showing some betterment, more or less cutting is still being done, which makes the situation more or less unsatisfactory from the standpoint of profits. It is claimed

that some producers either do not know their costs or else are marketing their output at figures that allow no profit. We quote one-pass box annealed black sheets, No. 28 gauge, at 2.20c., and No. 28, galvanized, at 3.25c., but these prices are being shaded on good orders. The regular price of painted roofing sheets, No. 28, is 1.55c. per square, and of galvanized, No. 28, is 2.80c. per square, for 2 1/2-in. corrugations, but these prices are also being shaded.

Hoops and Bands.—The market is showing betterment in demand and prices are a trifle stronger, but actual orders are still confined to small lots to cover current needs. The nominal price of hoops is 1.60c. and bands 1.20c., with steel card extras on the latter, and while these prices are being more generally observed they are still being shaded to some extent on good orders.

Spelter.—This trade continues very dull, but prices are a trifle firmer. We quote prime grades of Western at 4.95c. to 5c., East St. Louis.

Railroad Spikes.—The railroads are specifying quite freely on contracts placed some time ago, but new orders coming in are mostly in small lots to cover repairs, very little new construction work being under way at present by the railroads. We quote railroad spikes at \$1.60 to \$1.65 for 5 1/2 x 9-16 in., and \$1.70 to \$1.75, base, for the smaller sizes, in carloads and larger lots, 5c. per keg additional being charged for less than carloads.

Merchant Pipe.—No large contracts for line pipe have recently been placed, but the Ohio Fuel Supply Company is arranging to lay a gas line from Weston, W. Va., to the Cincinnati District, and has been in the market for some time for about 80 miles of 18-in. pipe, which it expects to buy as soon as rights of way for the line have been secured. The general demand for merchant pipe is holding up remarkably well, actual orders entered by the mills so far this month showing an increase over April. It is stated that regular discounts on both iron and steel pipe are being absolutely maintained.

Boiler Tubes.—Inquiry is a little better, and actual orders entered by the mills for railroad and merchant tubes are showing some improvement. However, consumers are still buying mostly in small lots to cover current needs, and there is more or less shading of discounts.

Iron and Steel Scrap.—One leading consumer of heavy steel scrap has been a persistent buyer for several weeks through a local dealer, and prices on this material are very firm and showing a higher tendency. Dealers and the mills that make scrap believe that prices will show further betterment and are inclined to hold their material for higher figures. The consumption of scrap is steadily broadening and promises to be quite heavy for some little time. We quote heavy steel scrap for delivery in the Pittsburgh District at \$15.50 to \$15.75, and for Monessen, Sharon, Follansbee and Steubenville delivery at \$16 to \$16.25 per gross ton. The Monessen interest has bought a very large tonnage of heavy steel scrap in the past two or three weeks. Dealers quote about as follows: Cast iron borings, \$9.50 to \$10; bundled sheet scrap, \$12.50, at point of shipment; No. 1 cast, \$15 to \$15.50; No. 2, \$14 to \$14.50; No. 1 railroad malleable, \$14 to \$14.50; sheet bar crop ends, \$16.50 to \$16.75; low phosphorus melting stock, 0.04 and under, \$18.50 to \$19; rerolling rails, \$15.50 to \$15.75; steel axles, \$17.25 to \$17.50; grate bars, \$10.75 to \$11; old car wheels, \$15 to \$15.50; locomotive axles, \$22 to \$22.50; locomotive tires, \$17 to \$17.50; machine shop turnings, \$10.50 to \$11; iron axles, \$18.50 to \$19; iron rails, \$16 to \$16.25, all in gross tons, f.o.b. Pittsburgh, unless otherwise stated. We note a sale of 300 tons of bundled sheet scrap at \$12.50 at point of shipment, or \$13.50, delivered; 2000 tons of heavy steel scrap at \$15.75, and 1000 tons at \$16, delivered.

Coke.—A furnace interest has closed a contract for a large tonnage of furnace coke for delivery over second half of the year at the reported price of \$1.65 per net ton, at oven. Standard makes of furnace coke for spot shipment can still be had at \$1.50 to \$1.60 per net ton, at oven, while on contracts for shipment over last half of the year \$1.65 for medium grades up to \$1.85 for standard makes is being quoted. There has not been much buying of foundry coke for second half, and 72-hr. grades of Connellsville foundry coke are held at \$1.80 to \$1.85, while on contracts from \$2.15 to \$2.25 per net ton, at ovens, is being quoted. No material progress has been made in the proposed consolidation of about 60 of the coke plants, and it is not improbable that if the consolidation is put through a smaller number of works will be included. The output of coke last week in the Upper and Lower Connellsville regions was 252,485 tons, an increase over the previous week of more than 8000 tons.

The Struthers Furnace Company has awarded the contract for the rebuilding of its blast furnace stack at Struthers, Ohio, to the William B. Pollock Company, Youngstown. The stack will be 20 x 85 ft., and will have a daily capacity of about 400 tons. It is expected that it will be ready for operation about October 1.

Cleveland.

CLEVELAND, OHIO, May 25, 1909.

Iron Ore.—Stimulated by the improved condition of the iron and steel trade, more activity is becoming apparent in the ore market. A good round tonnage has been sold during the week and a number of other consumers are in the market and are expected to place contracts in the next few days. One interest reports actual sales during the week aggregating about 350,000 tons, and good sized blocks have been sold by nearly all the ore firms. Some of the furnace interests are placing orders now for their full requirements for the year. The question of ore prices was solved by the advance in prices on finished lines and last year's prices are being firmly maintained except on silica ores, on which the prices will average about 10 per cent. lower than last year. Ore shipments from the docks have fallen off since the opening of navigation, owing to direct shipments from the boats to the furnace yards. Considerable vessel tonnage for ore has been chartered during the week at 65c. from the head of Lake Superior, the rate that prevailed last year. Conditions in the lake strike situation remain about the same as last week. No trouble is experienced in securing all the men needed to operate the boats. A strike is threatened by the Longshoremen's Union, which wants the dock managers to give members of the union preference in hiring men. The open shop system is now in force among the dock managers. No action will be taken, however, until the matter is submitted to a referendum vote. Ore prices at Lake Erie docks, per gross ton, are as follows: Old Range Bessemer, \$4.50; Mesaba Bessemer, \$4.25; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.50.

Pig Iron.—A fair amount of buying is still going on and prices are somewhat firmer. One local interest reports sales during the week aggregating 12,000 tons, the bulk of which was for Eastern delivery. Another interest reports sales from a northern Ohio furnace amounting to 3500 tons, the largest lot being 1000 tons. The greater part of the tonnage sold was foundry iron, the remainder being malleable. The melt has increased somewhat and this has caused some demand for foundry iron, for which there had been little inquiry recently. In this territory little was sold during the week, but several inquiries have developed from local and other northern Ohio consumers for lots ranging from 200 to 500 tons. Some inquiries have also come from Erie, Pa., engine builders. Foundry iron is firm, at \$14.25 to \$14.50, Valley furnace, for No. 2, for the last half, although the former price might be shaded for spot shipment. Some of the Valley interests, however, are holding for higher prices, and one producer is quoting No. 2 at \$14.75 for the third quarter and \$15 for the fourth quarter. One local interest has advanced its price for outside shipment from \$14.50 to \$15 for No. 2 for the last half. We quote delivered, Cleveland, for the last half, as follows:

Bessemer	\$15.90
Northern foundry, No. 1	\$15.05 to 15.90
Northern foundry, No. 2	15.15 to 15.40
Northern foundry, No. 3	14.65 to 14.90
Gray forge	14.00 to 14.50
Southern foundry, No. 2	15.60 to 16.10
Jackson County silvery, 8 per cent. silicon	20.05

Coke.—Some foundry coke contracts are being placed for the balance of the year, but the market is generally quiet. Prices are about stationary. We quote standard furnace coke for spot shipment at \$1.50 to \$1.60 per net ton, at oven, and \$1.75 on contract, for the balance of the year, although some interests are asking \$1.90. Standard 72-hr. foundry coke is held at \$1.85 to \$2 for spot shipment and \$2 to \$2.25 on contract.

Finished Iron and Steel.—Mills are still getting a good volume of specifications on contracts, although the aggregate is not so heavy as during the previous two or three weeks. Most consumers of steel bars are covered for the balance of the year, and as the mills are well filled up the mill agencies generally are not seeking new bar contracts. Some of the mills are not promising deliveries on steel bars within 60 days to six weeks, and one independent interest has advanced its price on steel bars to 1.25c., Pittsburgh. The leading interest and some of the independents are refusing to make any contracts for future delivery. All mills are firmly maintaining the ruling prices on steel bars, plates and structural material. Little structural business is being placed at present prices. A large share of the structural consumers are covered for their requirements until October 1 at a price of 1.20c. to 1.25c., Pittsburgh, and some are protected at those prices on specific work now coming out for which bids were being made before the recent advance. The contract for the Brown Building, Cleveland, has been awarded to the Interstate Engineering Company, Bedford, Ohio. The contract for the plain material, 1300 tons, has not yet been placed. The Carnegie Steel Company has taken orders from the Massillon Bridge Company for 2000 tons for dock sheds in New Orleans and for bridge work. The demand for plates is only fairly good. The demand for sheets is not active and considerable price shading is still going on, particularly on galvanized sheets. The demand

for shafting continues good, but prices are still weak. The demand for light rails in car lots has improved and the new prices are being maintained. The New York Central Lines have placed an additional order for 1000 kegs of spikes. The demand for iron bars is still light, but prices are slightly firmer. We quote iron bars at 1.25c. to 1.30c., Cleveland.

Old Material.—The market is now fairly active and prices are firmer, an advance of 50c. a ton being noted in several grades. Dealers expect a further advance and are willing to sell only in small quantities and do not care to sell short. The local demand is restricted, owing to an embargo placed by one of the larger mills which is unable to take on scrap at present because its tracks are filled with material to be used for extensions. A small tonnage offered by the Nickel Plate Railroad last week brought good prices. The demand for cast scrap is light. Dealers' prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails	\$14.00 to \$14.50
Old iron rails	16.00 to 16.50
Steel car axles	19.00 to 19.50
Old car wheels	14.50 to 15.00
Heavy melting steel	14.00 to 14.50
Relaying rails, 50 lb. and over	21.50 to 22.50
Agricultural malleable	12.00 to 12.50
Railroad malleable	13.50 to 14.00
Light bundled sheet scrap	8.00 to 8.50

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	\$17.00 to \$17.50
Cast borings	6.50 to 7.00
Iron and steel turnings and drillings	7.50 to 8.00
Steel axle turnings	9.00 to 9.50
No. 1 busheling	12.00 to 12.50
No. 1 railroad wrought	12.50 to 13.00
No. 1 cast	12.00 to 12.50
Stove plate	10.50 to 11.00
Bundled tin scrap	9.25 to 9.75

Buffalo.

BUFFALO, N. Y., May 25, 1909.

Pig Iron.—The demand continues strong, and new business is developing in good volume, with indications everywhere of a broadening market. Specifications on contracts are being anticipated in many instances, especially by the smaller foundries, now becoming busier. Prices are stronger for forward deliveries, but have not advanced for the present quarter, although the surplus production is being rapidly taken up. We quote, as follows, for second and third quarter deliveries, f.o.b. Buffalo:

No. 1 X foundry	\$15.25 to \$15.75
No. 2 X foundry	14.75 to 15.25
No. 2 plain	14.50 to 15.00
No. 3 foundry	14.25 to 14.75
Gray forge	14.25 to 14.50
Malleable Bessemer	14.50 to 15.50
Basic	15.50 to 15.75
Charcoal	19.50 to 20.00

Finished Iron and Steel.—New orders and specifications on contracts continue heavy for bars, small shapes, plates and cold rolled steel. Owing to the increasing influx of orders, mill deliveries are becoming retarded, and from four to six weeks is now about the average time promised for delivery on bars and shapes, with probability that deliveries will be still further extended if the demand continues at its present volume. It is understood that one or two mill interests have advanced prices for steel bars to \$1.25, Pittsburgh. There is an improvement in the demand for sheets, with prices firmer. Orders for wire products continue heavy. In structural lines business continues to develop in satisfactory volume. The American Bridge Company was the low bidder for the 500 tons of steel for the eight-story Y. M. C. A. men's hotel, Buffalo, bids for which were received this week, and the H. C. Harrower Iron & Steel Works for the 450 tons in the M. Wile Company warehouse being erected by the Hamlin Realty Company. The Lackawanna Steel Company will furnish the 4000 tons of steel for the new shops of the Transcontinental Railway, at Winnipeg, to be fabricated by the Manitoba Bridge & Iron Works; also 150 tons for the Nichols Preparatory Schools, Buffalo, to be fabricated by the Buffalo Structural Steel Company.

Old Material.—There is an improvement in the tone of the trade. Consumers are coming into the market a little more freely, notwithstanding the fact that prices have been advanced by dealers on nearly all grades. Dealers are also increasing their holdings in anticipation of an enlarged demand and higher prices. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel scrap	\$14.00 to \$14.25
Low phosphorus steel scrap	18.50 to 19.00
No. 1 railroad wrought	15.00 to 15.50
No. 1 railroad and machinery cast scrap	14.75 to 15.50
Old steel axles	16.25 to 17.00
Old iron axles	19.00 to 19.75
Old car wheels	14.50 to 15.00
Railroad malleable	13.25 to 13.75
Boiler plate	12.50 to 13.00
Locomotive grate bars	12.00 to 12.25
Pipe	11.50 to 12.00
Wrought iron and soft steel turnings	8.50 to 9.00
Clean cast iron borings	7.00 to 7.50
No. 1 busheling scrap	13.00 to 13.25

Cincinnati.

CINCINNATI, OHIO, May 26, 1909.—(By Telegraph.)

In the case of pig iron and finished products, both experiencing a little lull after a season of heavy buying, sales agents in this market seem to be going into statistics just now with unusual interest. One large pig iron concern is reported to have made a careful canvass and discovered that there are 1,300,000 tons of iron on furnace yards in all districts subject to sale, with consumption still lagging behind production. Spot business of all lines is quiet, and sellers are watching anxiously for the promised buying by railroad and other large consumers. Scrap dealers seem to be most strongly entrenched of the metal sellers, and all report business brisk, with prices stiffening. Coke has been strong and some good contracts for foundry grades have been made during the week.

Pig Iron.—Steel making irons are in best demand here and several large concerns are feeling the market. Speculators have also been conspicuous and there have been some offers made for large tonnages of Northern foundry and basic. Northern irons seem to be stiffest in price, \$14.50 at furnace being the best that can be done on No. 2 foundry for any delivery. An offer of \$14, Ironton, for 3500 tons for delivery in the Chicago District, was turned down by one of the largest producers. Southern irons are not so strong, although some of the leading interests claim to have such well filled order books as to warrant their practical withdrawal from the market; at least they are naming the prohibitive price of \$12 for No. 2. At least one Southern interest continues to sell No. 2 on the basis of \$11, Birmingham, for spot shipment, and \$11.75 can be done through the last half, \$11.50 for the third quarter, and \$12 for the last quarter alone. Some good sales of malleable have been made on a \$14.50 basis. Only one stove making interest is in the market, namely, an Ohio concern that is asking figures on an indefinite quantity of Nos. 2, 3 and 4 foundry for the last half. A large maker of sanitary goods, who purchased about 1500 tons during the foundrymen's convention, is seeking about double that quantity for Louisville delivery over last half. A southern Ohio steel maker is asking prices on 4500 tons of basic, and an Ohio engineering concern wants 700 to 800 tons of No. 2 foundry. A sale of 1100 tons of forge for southern Indiana delivery is reported at \$10.25 for early shipment. A number of sales of foundry iron are reported, ranging from 100 to 300 tons, mostly for the third quarter. A slight curtailment in production for the remainder of the month is promised in the South, through the inactivity of the Williamson Furnace and the early blowing out of a 5000 ton per month producer, also in Alabama. For early delivery and into the third quarter, f.o.b. Cincinnati, freight rates being \$3.25 from Birmingham and \$1.20 from Ironton, we quote as follows:

Southern coke, No. 1 foundry.....	\$15.00 to \$15.50
Southern coke, No. 2 foundry.....	14.50 to 15.00
Southern coke, No. 3 foundry.....	14.00 to 14.50
Southern coke, No. 4 foundry.....	13.50 to 14.00
Southern coke, No. 1 soft.....	15.00 to 15.50
Southern coke, No. 2 soft.....	14.50 to 15.00
Southern coke, gray forge.....	13.25 to 13.50
Ohio silvery, 8 per cent. silicon.....	19.70
Lake Superior coke, No. 1.....	16.20 to 16.70
Lake Superior coke, No. 2.....	15.70 to 16.20
Lake Superior coke, No. 3.....	15.20 to 15.70
Standard Southern car wheel.....	22.25 to 23.25
Lake Superior car wheel.....	21.75 to 22.75

(By Mail.)

Coke.—Reports from producing regions indicate an increase in production, but shipments are better. Some good sales of foundry coke have been made, considerable business resulting from foundrymen here during the week in annual convention. Spot Connellsville furnace coke is quotable at \$1.60 to \$1.75, at oven; on contract, \$1.65 to \$2; spot foundry, \$2 to \$2.25; on contract, \$2.25 to \$2.50, according to grade. Wise County furnace and foundry grades are unchanged, and Pocahontas is about the same also as last week—namely, furnace, \$1.75; foundry, \$2.15 to \$2.25.

Structural Material.—Local agencies reiterate declarations of firmness on the basis of 1.30c., Pittsburgh. Twisted steel bars for concrete work are still leading in this market, that type of heavy construction being most pronounced here at this time. Practically all the independent interests announce that they are sold up to January 1 and are chary of taking business beyond July 1 at existing prices, some claiming absolutely to refuse it.

Bars and Sheets.—Sellers report the steel bar price firm at 1.20c., Pittsburgh, or 1.35c., Cincinnati, and none of the aggressiveness displayed the past 8 or 10 weeks is shown in booking business. July 1 is the limit fixed for deliveries at the current quotations. Iron bars are showing no special strength, local mills getting a good share of what little business is going at something like 1.35c. to 1.45c., Cincinnati. Tin plate is very active. The Andrews Steel Company is operating four hot mills and expects to have the entire 10 in on June 1, the American Bridge Company having finished construction on the company's new building, which will greatly facilitate the work in transit between the mills and the annealing furnaces.

Old Material.—Scrap continues its upward movement,

the advance being from 25 to 50c. since last week. Local dealers have contracted with Eastern steel mills for a large tonnage of heavy melting steel during the week, and the market is reported active at \$13.50 to \$14, Cincinnati. Car wheels have been active also, the bulk of shipments going East and into Pittsburgh territory. We quote, f.o.b. Cincinnati, as follows:

No. 1 R. R. wrought, net ton.....	\$13.50 to \$14.00
Cast borings, net ton.....	6.25 to 6.75
Heavy melting steel scrap, gross ton...	13.50 to 14.00
Steel turnings, net ton.....	8.50 to 9.50
No. 1 cast scrap, net ton.....	12.50 to 13.00
Burnt cast, net ton.....	9.50 to 10.50
Old iron axles, net ton.....	17.00 to 17.50
Old iron rails, gross ton.....	15.00 to 15.50
Old steel rails, short, gross ton.....	13.50 to 14.00
Old steel rails, long, gross ton.....	13.50 to 14.00
Relaying rails, 56 lb. and up, gross ton.	21.50 to 22.00
Old car wheels, gross ton.....	14.00 to 14.50
Low phosphorus scrap, gross ton.....	14.00 to 14.50

Birmingham.

BIRMINGHAM, ALA., May 24, 1909.

The increased buying on the part of the railroads, while not yet assuming any very considerable proportions, causes a decidedly optimistic feeling in the trade generally. It is argued that with the present production of iron and steel being taken care of, there are bound to be very much better prices when the railroad demand should reach a normal basis. If the next 60 days should be favorable for crop development, then it can be reasonably expected that the railroad interests will enter the market in earnest. A recent sale of 15,000 tons of furnace coke was made at a good price. The reorganization of a Texas furnace proposition leads to the expectation that about 50,000 tons of Alabama furnace coke will be required there for delivery the next six months.

Pig Iron.—Alabama furnaces have made good sales of pig iron to New England foundries the past 10 days. This is a most hopeful sign, as they have been, to a great extent, shut out of that section for many months, and this recent business is splendid evidence of the strength of the market. While none of the furnace interests report large sales the past week, yet the smaller buyers are continuing to cover their requirements in lots of 100 to 2000 tons over the balance of the year. The price remains firm at \$11.50, Birmingham, for nearby delivery. Special irons continue to bring nice premiums. Charcoal iron is being taken now by the Pittsburgh roll makers and by some of the car wheel manufacturers, and brings from \$19 to \$19.50 at the furnace.

Cast Iron Pipe.—The pipe manufacturers are keeping busy with their bookings of some weeks ago, and while actual transactions are scarce, there is no tendency to change price. Figures remain at about \$24, Birmingham, for 4-in. water pipe. The manufacturers of sanitary pipe report a fair demand just now, due to the fact that some jobbers are no doubt stocking up at the present low figures ruling on this line.

Old Material.—There is practically no change in the scrap iron market. Dealers are not disposed to shade prices, and at the same time are not seeking any additional stocks, rather preferring to let the market take care of itself. The rolling mill at Anniston has suspended operations temporarily, and will probably roll no more bars for 30 or 60 days, depending upon the condition of the bar iron trade. Nominal quotations on scrap are as follows:

Old iron rails.....	\$13.50 to \$14.00
Old iron axles.....	14.50 to 15.00
Old steel axles.....	12.00 to 12.50
No. 1 railroad wrought.....	12.00 to 12.50
No. 2 railroad wrought.....	10.00 to 10.50
No. 1 country wrought.....	9.00 to 9.50
No. 2 country wrought.....	8.50 to 9.00
No. 1 machinery scrap.....	10.50 to 11.00
Tram car wheels.....	10.50 to 11.00
Old car wheels, standard.....	12.00 to 12.50
Stove plate and light cast.....	7.50 to 8.00
Cast borings.....	4.00 to 4.50

The Standard Nipple Mfg. Company, Pittsburgh, will shortly be succeeded by the Standard Nipple & Tool Company, which has applied for a Pennsylvania charter, with a capital of \$100,000. The plant is now located at 7440 Finance street, Pittsburgh, but all of its equipment will be removed within the next month to the plant formerly occupied by the Standard Stove & Range Company, West Newton, Pa., where the general office will be located. The main building is 100 x 500 ft. A new warehouse, 200 x 500 ft., is to be erected and new gas engines aggregating 150 hp., and tool room and other machinery installed. The Standard Nipple & Tool Company will manufacture all sizes of pipe nipples, having a capacity of 3,000,000 per month, and the well known line of Duplex chain pipe wrenches, formerly made by the older concern, a line of new patent wrenches and a pipe vise. The new plant will be ready to operate about July 1 and will employ about 100 men.

New York.

NEW YORK, May 26, 1909.

Pig Iron.—There have been further large sales of basic pig iron, the greater part thereof, however, being made between buyers and sellers in eastern Pennsylvania. Other districts participated only to the extent of a few good sized blocks. The last sales were made on the basis of \$15.50, delivered, eastern Pennsylvania. Inquiries for basic for New England delivery are still unsatisfied. Business in foundry irons has been moderate in volume, but in sympathy with the rise in basic pig Northern foundry irons are now held at higher figures and the market is stiffer. We quote \$16.75 to \$17 for No. 1 Northern foundry, \$16.25 to \$16.50 for No. 2 foundry and \$15.50 to \$15.75 for No. 2 plain, at tidewater. Alabama iron is quoted at \$16.25 to \$16.50 for No. 1 foundry and \$15.75 to \$16 for No. 2 foundry.

Steel Rails.—The month has yielded a good aggregate of orders, but the Western mills have taken practically all the business closed in the past week, the Santa Fe contract for 26,000 tons being the largest. The Duluth, Missabe & Northern Road has bought 1250 tons and the Copper Range Railway 1015 tons.

Structural Material.—Bids go in May 27 for 9500 tons for the substructure of the new post office at the Pennsylvania Railroad terminal. Spanning the railroad tracks, the girders will be unusually heavy, many being 70 to 80 tons. The Philadelphia & Reading Railroad has asked bids on the third lot of steel for the Philadelphia elevated work, 4000 tons, bringing the total to 22,000 tons. Bids go in this week on the new Vanderbilt Hotel, Park Avenue and Thirty-fourth street, 5000 tons. The Pennsylvania Tunnel & Terminal Company has given the contract for 2300 tons for its Sunnyside yard improvement to the McClintic-Marshall Construction Company. The Seaboard Air Line's last bridge contract, 1700 tons, went to the Pennsylvania Steel Company. The American Bridge Company has closed close to 60,000 tons this month, and the total will probably exceed 200,000 tons. A building on West Twenty-seventh street, for which 700 tons of Bethlehem shapes were specified, went to the A. E. Norton Company. Prices are somewhat stronger, particularly on smaller work, and some fabricators are asking at least a part of the recent advance on plain material in bidding on larger jobs.

Ferroalloys.—Numerous inquiries are in the market for 50 per cent. ferrosilicon, but prices are quite unsettled. Some business has been taken on a basis of \$65, Pittsburgh, but buyers are afraid of the market. In ferromanganese conditions appear somewhat better and orders have been taken at \$42, Baltimore.

Bars.—A much larger volume of business is reported by manufacturers of bar iron, at prices ranging from 1.35c. to 1.40c., tidewater. The more important Eastern bar iron mills are again actively employed, some of them being able to run on full time, double turn. Steel bars are firmly held at 1.36c. to 1.41c., tidewater.

Plates.—The recent stiffening in prices brought in quite a number of consumers, whose orders aggregated a much larger quantity than sales agents had been favored with for a long time. Eastern mills have been wary in taking contracts for forward delivery at current prices. The local demand is now much lighter, with tank plates and ship plates held at 1.46c., tidewater.

Old Material.—A much better demand prevails for practically all kinds of scrap except gray iron foundry stock. The improved trade is especially noteworthy in axles, wrought scrap, heavy melting steel scrap and wrought pipe. The improvement in the inquiries from rolling mills for their general scrap requirements is noted as a specially gratifying feature of the situation, but it is feared that the higher range of prices now asked may check the buying movement. Consumers of steel scrap are also less anxious than they have been, as prices are now so high that steel works will probably increase the percentage of their consumption of pig iron. Cast scrap and stove plate are neglected, while little is doing in old car wheels. Malleable scrap is scarce and higher. Some demand has sprung up for relayers, and sales are reported in quantities running up to 1000 tons. A sale of 3000 tons of detinned scrap has been made at \$14.25, delivered, in eastern Pennsylvania. Quotations are as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting.....	\$12.50 to \$13.00
Heavy melting steel scrap.....	12.50 to 13.00
Relaying rails.....	20.00 to 20.50
Old iron rails.....	15.00 to 15.50
Standard hammered iron car axles.....	17.00 to 17.50
Old steel car axles.....	16.50 to 17.00
No. 1 railroad wrought.....	14.50 to 15.00
Iron track scrap.....	12.00 to 12.50
No. 1 yard wrought, long.....	13.00 to 13.50
No. 1 yard wrought, short.....	12.00 to 12.50
Light iron.....	7.00 to 7.50
Cast borings.....	7.50 to 8.00
Wrought turnings.....	9.00 to 9.50
Wrought pipe.....	12.00 to 12.50
Old car wheels.....	14.00 to 14.50
No. 1 heavy cast, broken up.....	12.50 to 13.00
Stove plate.....	10.00 to 10.50
Locomotive grate bars.....	9.50 to 10.00
Malleable cast.....	14.00 to 14.50

Cast Iron Pipe.—The long expected extension of the high pressure fire service system of New York City is now about to be undertaken. On June 9 bids will be opened from contractors for this work, which will take 14,400 tons of pipe and about 1000 tons of other iron and steel. The general demand continues excellent, although orders individually are not large. The market is firm at a minimum of \$23.50 per net ton for 6-in. at tidewater.

Metal Market.

NEW YORK, May 26, 1909.

Copper.—A speculative movement in London has caused an advance in the price of standard warrants there, which is reflected in this market in the way of advancing quotations. Prices in this country have not risen as rapidly as abroad, and consequently there is considerable arbitrage business going on. This buying in America and selling in London netted a fair profit to those who were doing the business this morning. Early in the week the United Metals Selling Company advanced its quotation to 13.25c. for electrolytic, delivered in the Naugatuck Valley, 30 days. Other sellers were asking on Tuesday afternoon 13.12½c. This morning sales were made for European account at 13.25c., both net cash, and f.o.b. New York. The lake market is relatively stronger, the Calumet & Hecla being out of the market. Some sellers are quoting 13.37½c., but this is a limited trade only, and in other quarters 13.50c. has been paid. A bid of 13.50c., delivered at Chicago, has been refused by a prominent seller of lake copper. The export situation continues to be a feature of the market. So far this month 23,428 tons have gone abroad. This augurs well for promising statistics, which are expected to be given out by the Copper Producers' Association about the middle of next month. In London the market shows an advance of £1 from last week, spot closing at £6 26s., while futures are held at £6 16s. 3d. Best selected is quoted at £62. Sales of spot copper in London to-day aggregated 1000 tons, and sales of futures 3200 tons. The market closed strong.

Pig Tin.—The market is exceedingly dull, but the general trend has been upward, the following prices having been established for 5-ton lots during the week:

	Cents.
May 19.....	28.90
May 20.....	29.05
May 21.....	29.17½
May 24.....	29.15
May 25.....	29.15
May 26.....	29.15

The Banca sale, which occurred in Holland May 25, went off at the average figure of 29.25c., which is considered rather low. The sale, however, consisted of about 2000 tons, which large amount, perhaps, had some influence on the price. The London market is higher than last week, closing to-day at £132 5s. for spot and £133 5s. for futures. The arrivals so far this month amount to 3857 tons and there are afloat for American ports 2462 tons.

Lead.—The market is even stronger than last week. Sales have been made in New York at 4.40c. and in St. Louis at 4.30c. The American Smelting & Refining Company continues to quote shipment lead in 50-ton lots at 4.30c., but its shipping schedule is much delayed and orders booked now will probably be shipped during the latter part of June or early in July. Competent judges of the situation express the belief that higher prices will be named when the tariff situation is cleared up.

Spelter.—Although the price is slightly higher, the market is not especially active. In New York 5.20c. is quoted, and 5.05c. in St. Louis.

Antimony.—The large arrivals of antimony continue to be a dominant feature in this trade. Prices are largely nominal, Hallett's being quoted at 7.75c., Cookson's at 8.25c. to 8.50c., and outside brands at 7.50c.

Tin Plate.—The market is dull as far as new business is concerned, but the mills are actively engaged in turning out orders on old contracts. For 100-lb. I C coke plates \$3.64 continues to be quoted in New York and \$3.45, Pittsburgh. This is subject to the usual rebate of 5c. per box for large orders. In Swansea Welsh plates continue unchanged, at 11s. 9d.

Old Metals.—The following dealers' selling prices represent the New York market:

	Cents.
Copper, heavy cut and crucible.....	12.75 to 13.00
Copper, heavy and wire.....	12.50 to 12.75
Copper, light and bottoms.....	10.25 to 10.50
Brass, heavy.....	9.50 to 9.75
Brass, light.....	7.25 to 7.50
Heavy machine composition.....	11.75 to 12.00
Clean brass turnings.....	8.50 to 8.75
Composition turnings.....	9.50 to 10.00
Lead, heavy.....	4.10 to 4.20
Lead, tea.....	3.80 to 3.90
Zinc scrap.....	4.00

The Youngstown Sheet & Tube Company has placed an order with the Morgan Engineering Company, Alliance, Ohio, for eight electric travelling hoists for the new sheet and tube mills at East Youngstown, Ohio.

Iron and Industrial Stocks.

NEW YORK, May 26, 1909.

The market for securities has been exceedingly strong, with the industrial stocks attracting more than usual attention, which has perhaps been due to the continued reports of improvement in business. United States Steel common made another new high record, touching 60 $\frac{1}{2}$ on Monday. The following is the range of prices on active iron and industrial stocks from Thursday of last week to Monday of this week:

Allis-Chalm., com.	16 - 10 $\frac{1}{2}$	Railway Spr., com.	43 - 44
Allis-Chalm., pref.	51 $\frac{1}{2}$ - 52 $\frac{1}{2}$	Railway Spr., pref.	106
Beth. Steel, com.	27 $\frac{1}{2}$ - 29 $\frac{1}{2}$	Republic, com.	27 $\frac{1}{2}$ - 29 $\frac{1}{2}$
Beth. Steel, pref.	57 $\frac{1}{2}$ - 61 $\frac{1}{2}$	Republic, pref.	88 $\frac{1}{2}$ - 91 $\frac{1}{2}$
Can., com.	13 $\frac{1}{2}$ - 14 $\frac{1}{2}$	Sloss, com.	81 $\frac{1}{2}$ - 84 $\frac{1}{2}$
Can., pref.	82 - 83 $\frac{1}{2}$	Sloss, pref.	115
Car & Fdry, com.	54 $\frac{1}{2}$ - 56 $\frac{1}{2}$	Pipe, com.	33 $\frac{1}{2}$ - 34
Car & Fdry, pref.	115	Pipe, pref.	78 - 78 $\frac{1}{2}$
Steel Foundries...	39 - 39 $\frac{1}{2}$	U. S. Steel, com.	58 $\frac{1}{2}$ - 60 $\frac{1}{2}$
Colorado Fuel...	40 $\frac{1}{2}$ - 42	U. S. Steel, pref.	119 $\frac{1}{2}$ - 120 $\frac{1}{2}$
General Electric...	159 $\frac{1}{2}$ - 161 $\frac{1}{2}$	Westinghouse Elec.	83 - 84 $\frac{1}{2}$
Gr. N. ore cert.	72 - 73 $\frac{1}{2}$	Chi. Pneu. Tool...	23 $\frac{1}{2}$ - 25
Int. Harv., com.	81 $\frac{1}{2}$ - 83 $\frac{1}{2}$	Am. Ship, com.	60 - 60 $\frac{1}{2}$
Int. Harv., pref.	120 - 120 $\frac{1}{2}$	Am. Ship, pref.	107
Locomotive, com.	56 $\frac{1}{2}$ - 57 $\frac{1}{2}$	Cambria Steel...	38 $\frac{1}{2}$ - 39 $\frac{1}{2}$
Locomotive, pref.	115	Lake Sup. Corp...	31 $\frac{1}{2}$ - 31 $\frac{1}{2}$
Nat. En. & St., com.	15 - 15 $\frac{1}{2}$	Warwick...	8 - 8 $\frac{1}{2}$
Nat. En. & St., pref.	86 $\frac{1}{2}$ - 86 $\frac{1}{2}$	Crucible St., com.	8 $\frac{1}{2}$ - 9
Pressed St., com.	41 $\frac{1}{2}$ - 42 $\frac{1}{2}$	Crucible St., pref.	67 - 68
Pressed St., pref.	103		

Last transactions up to 1.30 p.m. to-day are reported at the following prices: United States Steel common 60 $\frac{1}{2}$, preferred 119, bonds 104 $\frac{1}{2}$; Car & Foundry common 55 $\frac{1}{2}$, preferred 115; Locomotive common 57 $\frac{1}{2}$, preferred 115; Colorado Fuel 40 $\frac{1}{2}$; Pressed Steel common 42, preferred 103 $\frac{1}{2}$; Railway Spring common 43 $\frac{1}{2}$; Republic common 28, preferred 90 $\frac{1}{2}$; Sloss-Sheffield common 82 $\frac{1}{2}$; Cast Iron Pipe common 32 $\frac{1}{2}$, preferred 77 $\frac{1}{2}$; Can common 12 $\frac{1}{2}$, preferred 80 $\frac{1}{2}$. This morning United States Steel common made a still higher record, selling up to 61 $\frac{1}{2}$.

Iron and Steel Bonds.

Chisholm & Chapman, 18 Wall street, New York, furnish the following quotations:

	Bid.	Asked.
Bethlehem Steel 1st ext. 5s, due January, 1926	115 $\frac{1}{2}$	118
Bethlehem Steel purchase money 6s, August, 1908	100	100
Buffalo Iron 5s, October, 1925	99 $\frac{1}{2}$	100
Buffalo & Susquehanna Iron 1st 5s, June, 1932	99 $\frac{1}{2}$	100
Buffalo & Susquehanna Iron deb. 5s, January, 1926	98	98
Dominion Iron & Steel 5s, July, 1929	90	90
La Belle Iron 1st 6s, December, 1923	103 $\frac{1}{2}$	106
Lackawanna Steel 1st 5s, April, 1923	98 $\frac{1}{2}$	100
Maryland Steel 1st 5s, February, 1922	101	101
Penn Steel 1st 5s, November, 1917	101	101
Pennsylvania & Maryland Steel 6s, September, 1925	109	110 $\frac{1}{2}$
Republic Iron & Steel 1st 5s, October, 1934	100	100
Sloss Iron & Steel 1st 6s, February, 1920	105 $\frac{1}{2}$	108
Sloss Iron & Steel consol. 4 $\frac{1}{2}$ s, April, 1918	94 $\frac{1}{2}$	96 $\frac{1}{2}$
Jones & Laughlin 1st 5s, May, 1939	99 $\frac{1}{2}$	99 $\frac{1}{2}$

United States Steel Corporation.

Collateral Trust 5s, Series A, C, E, April, 1951	114 $\frac{1}{2}$	115 $\frac{1}{2}$
Collateral Trust 5s, Series B, D, F, April, 1951	114 $\frac{1}{2}$	115 $\frac{1}{2}$
Sinking Fund 5s, April, 1933	104 $\frac{1}{2}$	104 $\frac{1}{2}$
Union Steel 1st 5s, December, 1952	104 $\frac{1}{2}$	105
Clairton Steel 5s, 1908-1913	100	100
St. Clair Furnace 1st 5s, 1910-1939	100	100
St. Clair Steel 1st 5s, 1908-1926	100	100
Illinois Steel deb. 5s, January, 1910	100 $\frac{1}{2}$	100 $\frac{1}{2}$
Illinois Steel 5s, April, 1913	100 $\frac{1}{2}$	100 $\frac{1}{2}$

All bonds quoted "and interest."

Dividends.—The General Electric Company has declared the regular quarterly dividend of 2 per cent., payable July 15.

The Railway Steel Spring Company has declared the regular quarterly dividend of 1 $\frac{1}{4}$ per cent. on the preferred stock, payable June 10.

The American Car & Foundry Company has declared the regular quarterly dividend of 1 $\frac{1}{4}$ per cent. on the preferred stock and $\frac{1}{2}$ per cent. on the common stock, both payable July 1.

The Thompson Connellsville Coke Company, Pittsburgh, has contracted to furnish a leading independent blast furnace interest with its supply of coke for a period of years, aggregating about 400,000 tons a year at a certain fixed price. This company owns 1600 acres of fine coking coal lands near Republic Station, on the Monongahela Railroad, in Fayette County, Pennsylvania, has now in operation 400 coke ovens and has practically completed about 300 more, and will have 100 more ready for operation about November 1. Its works are equipped with Covington coke extracting machines and other modern equipment.

At the annual meeting of the International Nickel Company, held in Jersey City May 25, the financial report for the fiscal year ending March 31, 1909, was pre-

sented, showing total income of \$2,162,698, a decrease of \$272,259 and surplus after dividends of \$470,761, a decrease of \$319,248. This surplus is equal to 5.34 per cent. on the \$8,822,662 common stock outstanding. The total surplus is now placed at \$2,456,900. The report expresses much satisfaction with the development of a demand for Monel metal, produced by one of its subsidiary companies from Creighton ores. It is expected to be an important factor in the company's future operations and earnings.

Russian Sheet Iron Making.

In the course of the discussion following the reading of a paper on "Corrosion of Iron and Steel," by Edward Crowe, before the Cleveland Institution of Engineers, and published in the *Transactions* of that body, an interesting contribution was made by Joseph Harrison, who referred to the manufacture of the soft steel sheets usually known as Russian sheet iron, the process of which he had witnessed while he was traveling in the Ural Mountains. These sheets are universally used in Russia for roofing. They are not corrugated and are neither painted nor protected in any way after they leave the mill, and they show no signs of corrosion after being in use for 20 years. Mr. Harrison said:

"I watched very carefully the making of these sheets, from the sheared bar to the finished sheet, time after time, and the only difference I could notice between their methods and ours was that as they have no coal there they have to use wood for the heating furnaces, and that they hammer the sheets under a steam hammer in packets of 120, with a $\frac{1}{2}$ -in. plate top and bottom, as soon as they leave the rolls, and while they are pretty hot, but barely red hot. The bars are of basic open hearth steel, and the wood they use in the heating furnaces consists of green branches from the pines, not log wood. These branches give a white, fumeless flame, besides which, of course, there is a deal of moisture coming off them, and I rather fancy this has something to do with it.

"In hammering the sheets those from several mills are gathered up to one hammer and gradually piled on the bottom $\frac{1}{2}$ -in. plate topped upon the anvil until they number 120, and then the top $\frac{1}{2}$ -in. plate is put on, and as the hammer begins to fall, very gently at first, the whole packet is kept moving round, so that every part gets hammered. The hammering is only light at any time, and after about 2 or 3 min. the sheets are all flattened out. They are then separated out, 60 being interleaved with 60 from the previous packet of 120, and the other 60 left over for the next, and these 120 go forward to another hammer. The hammering is then gone through again in the same way. They are then taken off, opened out and made up again into a packet of 240 upon the anvil of another steam hammer, and there receive the final hammering for 2 or 3 min.

"They are then sorted into various qualities, sheared to one uniform size, 2 ft. 4 in. by 4 ft. 8 in., and packed for the market immediately on leaving the shears. I ought to say there is no pickling or dressing applied during this hammering, or afterward, except that as each sheet is laid on the first packet it is swept over with a broom made of birch twigs to clean off any dust or grit, the broom being first dipped in water. Also that after every three or four sheets have been laid on, in making up the packets in each stage they lift up the edges and throw a little powdered charcoal between the sheets to get a better surface upon them. They use powdered charcoal between the sheets when they are put together in rolling, and also throw it on them as they go through the rolls."

Effective June 1, the Shenango Furnace Company, Cambria Steel Company and Jones & Laughlin Steel Company will restore the 10 per cent. reduction of wages in blast furnace labor which went into effect April 1. The improved condition of the steel trade is given as the reason for taking this action.

The Cost of Steel Making in Foundries.*

BY BRADLEY STOUGHTON.

The object of this study is not particularly to publish the cost of making steel for castings, but rather to consider this subject from the standpoint of the future relation of electric steel making processes to the present steel making processes in foundry work.

Acid Open Hearth.

The cost of steel making by the acid open hearth process is shown in the following table. In connection with this and the other tables it is to be observed that the price of raw materials is figured on the basis of a short ton, and all prices in this paper are based on the current price of the materials in Pittsburgh the first week of May, 1909:

	Price of raw materials per 2,000 lb.		Per 2,000 lb. of steel in ladle.		Cost.	Cost.
	2,000 lb.	Weight used.	Pounds.	Per cent.		
Pig iron.....	\$14.00	300	15		\$2.10	....
Heads, gates, &c.....	14.00	660	33		4.62	....
Foreign scrap.....	14.50	1,080	54		7.83	....
Defective castings, account bad metal.....	50.00	20	1		.50	....
Ferroalloys.....	40.60	29	1		.59	....
Total metal.....	2,089	104			\$15.64	\$15.64
Operating costs.....					†5.50	†8.85
Cost of steel in ladle.....					\$21.14	\$24.49
Cost of steel in ladle + 65 per cent.‡ =.....					\$32.52	\$37.68
Less credit for heads, &c., as scrap =.....					4.62	4.62
Net cost of steel in castings.....					\$27.90	\$33.06

* The price given for defective castings is over and above their value as scrap. See the text following for further discussion of this charge.

† The charge of \$5.50 for operating costs is the figure for a 25-ton furnace and large tonnage; that of \$8.85 is for a small furnace and small production.

‡ Of the steel in the ladle, 65 per cent. goes into castings; 33 per cent. goes into heads, gates, &c.; 2 per cent. is lost in spatter, &c.

It is not to be supposed that these figures will be accepted by every one as representative of their practice or anything like it, but the prices and weights of raw materials can be changed by any one to conform with his practice. Especially the item of "heads, gates, &c.," will depend largely upon the class of work made. No doubt there are some foundries in which the percentage of heads, gates, skulls, scrap, &c., is less than 33, while in others it will be above that figure. One has only to consider the difference in this respect between a foundry making steel rolls and one doing electrical work—notably castings for motors—to appreciate how great a difference will exist. I have adopted here 33 per cent. of scrap in the case of all processes to make this item comparative.

The item "defective castings," chargeable against the furnace, as distinguished from those chargeable against bad molding, will also vary greatly in different places, and it is probably impossible to estimate an average figure, either for the percentage of those made or for the price. The latter will depend partly on the average selling price of the castings and partly on the condition of the castings when the defects were discovered, as, for example, whether costs of cutting off heads and gates, cleaning, shipping to and from the customer, &c., should be included. In point of fact it is probable that there are not many foundries in which the defective castings chargeable against bad metal are differentiated from those chargeable against bad molding, yet it is evident that the former only should be included in the cost of steel. Defective castings chargeable against molding are included here in the item of heads, gates, &c.

The charge of \$5.50 for operating costs per ton is the practice with a 25-ton furnace operating at maximum capacity and charging raw materials by hand. For small furnaces, and furnaces operating at low capacity, this item will be materially larger. It is not to be supposed that the \$5.50 is a minimum figure, as, no doubt, some practice is better than this, and \$8.85 is not a maximum figure, as the cost of some furnaces is somewhat higher.

* Read at the Cincinnati convention of the American Foundrymen's Association, May, 1909.

Converter.

The cost of steel making by the converter process is shown in the following table, where the same comments apply as those made in connection with the acid open hearth process:

	Price of raw materials per 2,000 lb.		Per 2,000 lb. of steel in ladle.		Cost.	Cost.
	2,000 lb.	Weight used.	Pounds.	Per cent.		
Pig iron.....	\$14.00	300	15		\$2.10	....
Pig iron.....	17.40	1,280	64		11.14	....
Heads, gates, &c.....	14.00	660	33		4.62	....
Defective castings, account bad metal.....	*80.00	20	1		1.80	....
Ferroalloys.....	40.60	35	2		.71	....
Total metal.....	2,295	115			\$19.37	\$19.37
Operating costs.....					‡3.50	‡5.50
Cost of steel in ladle.....					\$22.87	\$24.87
Cost of steel in ladle + 65 per cent. =.....					\$35.18	\$38.26
Less credit for heads, &c., as scrap.....					4.62	4.62
Net cost of steel in castings.....					\$30.56	\$33.64

* See footnote under acid open hearth table.

† The percentage of defective castings in converter practice will actually be less than this, so that the cost is a little higher than justice to average converter practice demands. In the absence of average figures we have charged it the same as acid open hearth, with this verbal correction.

‡ Operating cost \$3.50 is for one 2-ton converter making 150 tons per week. The \$5.50 per ton is a 2-ton converter with small production.

The operating cost of \$3.50 per ton applies to the making of 150 tons of castings per week in one converter. It will appear very low to some practitioners, who have to pay a high price for fuel, &c., and whose tonnage is lower. A second figure of \$5.50 per ton is, therefore, shown to apply under such circumstances.

The waste of metal of only 15 per cent. shown in the foregoing table will also appear low to many whose practice is not as favorable as this, and, therefore, the following table is given to illustrate the cost under such conditions:

Converter with Large Waste.

	Price of raw materials per 2,000 lb.		Per 2,000 lb. of steel in ladle.		Cost.	Cost.
	2,000 lb.	Weight used.	Pounds.	Per cent.		
Pig iron.....	\$14.00	300	15		\$2.10	....
Pig iron.....	17.40	1,360	68		11.83	....
Heads, gates, &c.....	14.00	660	33		4.62	....
Defective castings, account bad metal.....	80.00	20	1		.80	....
Ferroalloys.....	40.60	38	2		.77	....
Total metal.....	2,378	119			\$20.12	\$20.12
Operating costs.....					3.50	5.50
Cost of steel in ladle.....					\$23.62	\$25.62
Cost of steel in ladle + 65 per cent. =.....					\$36.34	\$39.42
Less credit for heads, &c., as scrap.....					4.62	4.62
Net cost of steel in castings.....					\$31.72	\$34.80

It will be observed that the converter is not in a position to compete on even terms with either the acid or basic open hearth process and must rely on a special grade of work for its field. This field, as is well known, is the manufacture of steel for small castings, where the small converter now holds the predominant position. Since the electric process will doubtless first enter this same field, it may be well to consider anew the acid and basic open hearth processes from this standpoint.

Basic Open Hearth.

The cost of making steel for castings by the basic open hearth process is shown in the following table, and the same comments made under the head of acid open hearth steel will apply here:

	Price of raw materials per 2,000 lb.		Per 2,000 lb. of steel in ladle.		Cost.	Cost.
	2,000 lb.	Weight used.	Pounds.	Per cent.		
Pig iron.....	\$12.75	1,040	52		\$6.63	....
Heads, gates, &c.....	14.00	660	33		4.62	....
Foreign scrap.....	11.15	350	17½		1.95	....
Defective castings*.....	50.00	40	2		1.00	....
Ferroalloys.....	40.60	33	1½		.67	....
Total metal.....	2,123	106			\$14.87	\$14.87
Operating costs.....					†0.10	†9.55
Cost of steel in ladle.....					\$20.97	\$24.42

Cost of Steel in Castings.			
Cost of steel in ladle + 65 per cent.*	\$32.26	\$37.57	
Less credit for heads, &c., as scrap	4.62	4.62	
Net cost of steel in castings	\$27.64	\$32.95	

* See footnote under the acid open hearth table.

† See footnote under the acid open hearth table.

‡ Of the steel in the ladle, 65 per cent. goes into castings; 33 per cent. goes into heads, gates, &c.; 2 per cent. is lost in spattering in pouring.

The difference in costs between basic and acid open hearth shown here is less than the experience of several would lead them to believe. The explanation of this is that the basic open hearth process is in use generally in districts where low phosphorus raw materials sell at a lower price as compared with high phosphorus raw materials than is the case in the Pittsburgh District, and also because the greater proportion of defective castings made in the basic process is not ordinarily included in figuring the cost of the steel. Furthermore, in the cost here given the basic process is under a disadvantage through having to use 33 per cent. of its own heads and gates, which command a higher price in the market than scrap suitable for the basic process would demand. This condition explains the common practice of operating both a basic and acid furnace in the same plant, enabling the acid furnace to use the scrap from both processes at a favorable figure and thus allowing a larger proportion of cheaper basic scrap to be purchased outside. This condition is exemplified in the following table, where the benefit of the combination to both processes is shown:

Acid Open Hearth and Basic Open Hearth (When Together in One Plant).

Acid open hearth.						Basic open hearth.					
Price of raw materials per 2,000 lb.			Weight of steel in ladle.			Price of raw materials per 2,000 lb.			Weight of steel in ladle.		
2,000 lb.	Lb. used.	Per cent.	2,000 lb.	Lb. used.	Per cent.	2,000 lb.	Lb. used.	Per cent.	2,000 lb.	Lb. used.	Per cent.
Pig iron	14.00	300	15	\$2.10		\$12.75	1,040	52	\$6.63		
Heads, gates, &c. from both furnaces	14.00	1,320	66	9.24							
Foreign scrap	14.50	420	21	3.05		11.15	1,010	15½	5.63		
Defective castings	50.00	20	1	.50		50.00	40	2	1.00		
Ferroalloys	40.60	29	1	.59		40.60	33	1½	.87		
Total metal	2,089	104		\$15.48		2,123	106		\$13.93		
Operating costs				5.50					6.10		
Cost of steel in ladle				\$20.98					\$20.03		
Cost of Steel in Castings.											
Cost of steel in ladle + 65 per cent.				\$32.28					\$30.81		
Less credit for heads, &c., as scrap				4.62					4.62		
Net cost of steel in castings				\$27.66					\$26.19		

Acid and Basic Open Hearth Processes Making Small Castings.

The most important circumstance which keeps the open hearth processes largely out of the field of making steel for small castings, and which often results in open hearth foundries even sending their orders for small castings to foundries equipped with a converter or crucible process, is the large percentage of defective castings made by the open hearth process when producing steel for small castings, say, for example, castings thin in section and under 100 lb. in weight. In the two following tables I have shown the costs of steel in the acid and basic open hearth processes when the percentage of defective castings chargeable to bad metal is large. It may be that some open hearth foundries will deny the suggestion that the percentage of defective castings due to bad metal is ever so large as the figures given, but we do not think that the practice from which these figures were taken was unusually bad.

Acid Open Hearth (Making Small Castings).

Price of raw materials per 2,000 lb.						Per 2,000 lb. of steel in ladle.					
Weight used.			Per cent.			Weight used.			Per cent.		
2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.
Pig iron	14.00	300	15	\$2.10							
Heads, gates, &c.	14.00	660	33	4.62							
Foreign scrap	14.50	980	49	7.11							
Defective castings, account bad metal	50.00	120	6	3.00							
Ferroalloys	40.60	29	1	.59							
Total metal	2,089	104		\$17.42					\$17.42		
Operating costs				5.50					8.85		
Cost of steel in ladle				\$22.92					\$26.27		
Cost of Steel in Castings.											
Cost of steel in ladle + 65 per cent.*				\$35.26					\$40.41		
Less credit for heads, &c., as scrap				4.62					4.62		
Net cost of steel in castings				\$30.64					\$35.79		

* Of the steel in the ladle, 65 per cent. goes into castings; 33 per cent. goes into heads, gates, &c.; 2 per cent. is lost in

Basic Open Hearth (Making Small Castings).

Price of raw materials per 2,000 lb.						Per 2,000 lb. of steel in ladle.					
Weight used.			Per cent.			Weight used.			Per cent.		
2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.
Pig iron	12.75	1,040	52	\$6.63							
Heads, gates, &c.	14.00	660	33	4.62							
Foreign scrap	11.15	190	9½	1.06							
Defective castings	50.00	290	10	5.00							
Ferroalloys	40.60	33	1½	.87							
Total metal	2,123	106		\$17.98					\$17.98		
Operating costs				6.10					9.55		
Cost of steel in ladle				\$24.08					\$27.53		
Cost of Steel in Castings.											
Cost of steel in ladle + 65 per cent.				\$37.05					\$42.35		
Less credit for heads, &c., as scrap				4.62					4.62		
Net cost of steel in castings				\$32.43					\$37.73		

[Where the allowance for defective castings is 15 per cent., or \$7.50, and the cost of foreign scrap (17½ per cent.) is \$1.95, the above costs of steel in castings become \$35.43 and \$40.73 on the respective operating costs given.]

Crucible Process.

Wherever the electric steel making process has come into use it has been the crucible steel process that has usually been supplanted, with one or two notable exceptions. Therefore, it is the crucible steel foundries that view the electric process with the most interest. One important consideration in this connection is, however, the cost of installation, for this will be at least 10 times as much in the case of the electric process as in the case of the crucible process.

Crucible.

Price of raw materials per 2,000 lb.						Per 2,000 lb. steel in ladle.					
Weight used.			Per cent.			Weight used.			Per cent.		
2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.
Foreign steel scrap	14.50	1,330	66½	\$9.64							
Heads, gates, &c.	14.00	660	33	4.62							
Defective castings	125.00	10	½	.63							
Ferroalloys	40.60	12	½	.24							
Total metal	2,012	100½		\$15.13							
Operating costs				35.00							
Cost of steel in ladle				\$50.13							
Cost of Steel in Castings.											
Cost of steel in ladle + 66 per cent.*				\$75.95							
Less credit for heads, &c., as scrap				4.62							
Net cost of steel in castings				\$71.33							

* Of the steel in the ladle, 66 per cent. goes into castings; 33 per cent. goes into heads, gates, &c.; 1 per cent. is lost in pouring.

[When melting wrought iron, which is common practice when making the higher grades of tool steel, &c., the cost is \$83 for a 66 per cent. yield of castings, 1360 lb. of wrought iron casting (\$17.34) being used instead of foreign steel scrap, as above.]

Electric Steel Process.

The electric steel making process has two advantages over the crucible process: First, it can use the cheapest form of steel scrap available in the market, and, second, it can turn out the highest grade of steel made, the electric furnace surpassing all others in its control over the phosphorus, the sulphur, the temperature and the gases dissolved in the metal. The cost of making steel by the electric process is shown in the following table, which is based upon figures furnished by the makers of some of the important furnaces and from published results of actual steel melting operations on a commercial scale. It is evident that the chief factor in the cost is the price at which electric power is available and, therefore, five different estimates are made accordingly:

Electric.

Price of raw materials per 2,000 lb.						Per 2,000 lb. steel in ladle.					
Weight used.			Per cent.			Weight used.			Per cent.		
2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.	2,000 lb.	Pounds.	used.
Steel scrap	\$9.50	1,330	66½	\$6.32							
Heads, gates, &c.	14.00	660	33	4.62							
Defective castings	125.00	10	½	.63							
Ferroalloys	40.60	12	½	.24							
Total metal	2,012	100½		\$11.81							
Cost of steel in ladle.											
Electric power at 1 cent per kilowatt hour				\$28.81					\$39.03		
Electric power at 2 cents per kilowatt hour				37.96					52.89		
Electric power at 3 cents per kilowatt hour				47.11					66.76		
Electric power at 4 cents per kilowatt hour				56.26					80.62		
Electric power at 5 cents per kilowatt hour				65.41					94.49		

spattering during pouring. In making small castings the loss in pouring from a bottom-poured ladle would be much larger than this, and the cost of steel in castings would be increased \$1 to \$3 per ton, but data are lacking for exact estimates.

The Machinery Trade.

NEW YORK, May 26, 1909.

Business with machinery houses the past week was equal to, and in some instances better than, that of similar periods of the month, that received being of sufficient volume to warrant the belief that the upward movement, which started about a month ago, is not a spurt, attributed by some to a little spring activity, but a natural betterment, due to improved business conditions. This view of the situation is taken because of the increased activity on the part of intending purchasers, there being many more inquirers for tools who are requesting houses to have their salesmen call. While a great proportion of these inquiries call for small lots, considerable significance is attached to the reversal of the attitude of the prospective buyers. Inquiries appear to be numerous enough to keep the selling forces more actively engaged than for some time. No large inquiries or orders were reported the past week, but one of the important interests which the trade has been following closely for some time is expected to come into the market for an extensive list of tools within the next two weeks. It is also expected that the machine tool list of the Delaware, Lackawanna & Western Railroad will be closed about the end of the month. Thus far this month very little business has been received from the railroads by the machine tool houses, but manufacturers of some classes of supplies report a much better demand from that source. A little activity on the part of the railroads would give considerable impetus to the machine tool trade.

It is reported in the trade that an order for a large number of machine tools may be placed in this country by a foreign government. Several prominent machine tool builders have recently spent considerable time in Europe, figuring on the equipment, it is said, which is thought to be for an arsenal in one of the European countries.

The annual election of the Machinery Club of the City of New York was held in the club quarters Tuesday, May 25, when the following members were elected to the Board of Governors: For four years—F. H. Stillman, E. D. Meier, Charles A. Schieren, Jr., Robt. C. McKinney and L. P. Feustman; for three years, to fill resignations—W. L. Candee and E. H. Benner. The reports of the president and treasurer, which showed the club to be in a satisfactory financial condition, were accepted by the members, and a vote of confidence in the governors and committees was passed.

It is understood that orders for a considerable amount of equipment placed last fall by the American Locomotive Company were held up, and it is thought that the extensive list now being prepared covers the machines on which bids were received at that time. It will be remembered that the list which was issued covered about \$200,000 worth of machinery and the machines on which the company is preparing to get bids will aggregate in value \$250,000. This equipment is for the various plants, much of which will likely go to the Brooks plant at Dunkirk, N. Y., where it is building a boiler shop. It is said that plans are being prepared for other improvements at that plant, which will include a machine shop, tank shop, carpenter shop and pattern shop. It is understood to be the intention of the company to bring the efficiency of all of its important plants up to that at the Schenectady plant, and if this plan is carried out an extensive list of machines will have to be purchased.

A good deal of additional machine tool equipment will probably be purchased within the next few months by the Auto Press Company, College Point, L. I., which intends to greatly enlarge its plant. It is stated in the trade that the demand for the presses manufactured by this company has increased very largely, and that it has become necessary to have a much greater capacity in order to fill its orders. An extensive addition to the plant will be built, and as soon as the building contracts have been let it is likely that the company will be ready to take up the purchase of machinery.

Plans for the improvements to its plant contemplated last June by the Ames Iron Works, Oswego, N. Y., are being prepared and the carrying out of the project will necessitate the purchase of considerable new machinery. It will be remembered that the necessary property was secured on which buildings for the manufacture of boilers will be erected, covering a space of about 200 x 400 ft. It was the intention to make important changes in the present departments when the new additions are completed. The improvements as outlined include the removal of the foundry from the present location in the north end of the main building adjoining the machine shop to the present boiler shop, which is 100 x 400 ft. The present machine shop is to include the space from Cayuga to Seneca streets, having a ground area of 100 x 400 ft., with one gallery extending through from street to street, about 50 x 400 ft. Between the present

main buildings and the proposed new boiler shop its warehouses will be built, one with track connections to the machine shop, to be served by overhead traveling cranes, and the other connected by tracks to the boiler shop. These buildings are to be about 100 x 265 ft. each. The plans also contemplated the establishment of a main power plant in which will be installed all the power machinery. The total present area of floor space of the shops is about 130,000 sq. ft., which it was the intention to increase to 250,000 sq. ft. With the proposed improvements much better facilities for the handling and shipping of the products will be assured.

Presses and motors for electric drive will be purchased by the Schatz Mfg. Company, Chappaqua, N. Y., for the new plant it is to erect at Poughkeepsie, where it recently purchased a site. The plant will consist of two buildings, one story, 80 x 200 ft., steel truss roof and brick curtain wall construction. The company does not contemplate installing a large amount of new machinery in the plant.

F. C. Stevens, State Superintendent of Public Works, Albany, N. Y., will receive bids until June 22 for three barge canal contracts, involving the expenditure of about \$5,000,000. The work covers contract No. 30 for the construction of the Erie Canal, including the river and land line from Little Falls to Sterling Creek, Herkimer County, 14½ miles; No. 42, for the improvement of the canal from the Herkimer-Oneida County line to a point east of the Oriskany Lock, 9 miles; No. 36, for furnishing winches for operating movable dams in the Mohawk and Genesee rivers.

The Southern Equipment Company, North Birmingham, Ala., has been organized with W. J. Alford as manager, to deal in machinery, railway equipment, contractors' supplies, &c. The company would be pleased to hear from manufacturers with the view of representing them in the South, and is now in the market for a few second-hand machines, including a 10-ft. boring and turning mill, hydraulic wheel press; also a considerable tonnage of 30 to 60 lb. relaying rails.

Milwaukee Machinery Market.

MILWAUKEE, WIS., May 25, 1909.

So far as Wisconsin manufacturers are concerned, the business depression is rapidly becoming a thing of the past, and particularly is this true of the metal working industries. Orders on hand are sufficient to provide most of the shops with work approximating their normal capacity, and in several instances this is being taxed to supply the comparatively recent demand. Machine tools are now well along toward the head of the list; few large contracts have been obtained, but the aggregate of orders for single machines and small groups is considerable. Repair parts, improved specialties and patented attachments are also largely wanted in the rehabilitation of factories, mills and shops where the equipment has been allowed to run down somewhat as a result of close figuring of maintenance expenses. That class of business, which is relatively very profitable, constitutes an appreciable element in the present situation. Builders of motor launches, automobiles, cars and other vehicles in which gasoline engines furnish the propelling power continue to buy freely, and, besides giving strong support to manufacturers of shop machinery, this trade is keeping many other plants busy supplying various parts used in the final assembling of the apparatus constructed.

At the West Milwaukee shops of the Chicago, Milwaukee & St. Paul Railroad, 20 locomotives of the Mikado type are now being built for the Pacific Coast extension, and much work is in progress for the motive power departments of the company's Easterly divisions. The Chicago & Northwestern Railroad and Wisconsin Central lines of the Soo Road have also entered upon extensive betterments in which iron, steel and brass parts are largely used, and smaller roads, inclusive of the electric lines, add their full quota to the buying at present being done. As a large percentage of the purchases are made directly at various points in the State where apparatus and material are produced, it will be seen that in Wisconsin, at least, the awakening to activity of the railroad companies is a helpful factor in bringing about improved industrial conditions.

The construction departments of large manufacturing companies, including a number located in this section, together with contractors the country over, are coming into the market for apparatus in great variety. Owing to the fact that purchases this year have been delayed until beyond the customary season for laying in equipment, as well as materials, everything is now wanted in a hurry, and night shifts are needed in increasing numbers at shops in many parts of the State.

The Bucyrus Company, South Milwaukee, is working on an order from the Harriman lines, including a locomotive pile driver and four ballast unloaders; and the Bettendorf Axle Company, Davenport, has received from the same interests orders for a large number of steel trucks.

Among the projects for which considerable material will

be needed before fall is that of the Cincinnati Construction Company, which has already started work on an electric line between Madison and Janesville, Wis., and that of the Dousman & Marlboro Railroad, which has been formed by Milwaukee capitalists of recognized standing, headed by James M. Pereles, for the purpose of constructing a traction road between the points named.

At West Allis the gas engine building shops of the Allis-Chalmers Company present an active appearance. Among the orders just booked are three gas engines, aggregating 1000 hp., direct connected to three electric generators, for the Palmetto Phosphate Company, Tiger Bay, Fla.; a gas engine of approximately the same size, with generator, for the Armstrong Cork Company's plant at Camden, N. J.; a 1500-kw. gas driven electric unit and seven standard 30,000 cu. ft. gas driven blowing engines for various blast furnace plants.

The Fred M. Prescott Steam Pump Company is working on a 3,000,000-gal. pumping engine for the city of Phoenix, Ariz.; two of 2,500,000-gal. each for Los Angeles, Cal.; a similar unit for Santa Barbara, Cal.; another of 3,000,000-gal. for Oakland, Cal., and one of 1,500,000-gal. for the Arizona Copper Company, Globe, Ariz. In connection with most of these installations there is auxiliary apparatus to be purchased later.

In the Southwest, Fairbanks, Morse & Co. have also taken important contracts for execution at their factories, including the one located in Beloit, Wis., comprising equipment for railroad properties, industrial plants, mines and smelters. At Fort Worth, a coaling station of large capacity is to be erected for the Texas & Pacific Railroad.

The Power & Mining Machinery Company, among other orders, has received one for a 150-ton concentration plant, similar to that of double the capacity recently built for the Imperial Copper Company. It is understood that the new mill will be operated by the El Tiro Copper Company.

New incorporations include one formed by Charles and Robt. W. Kiewert of this city, in association with W. F. Hessel, New York, as the Charles L. Kiewert Company, to manufacture electrical specialties. No plans in relation to a factory have been announced.

Extensions planned for Wisconsin industries include additions to the plants of the Milwaukee Bridge Company, Wisconsin Machinery & Mfg. Company, Milwaukee Steel Post Company and Allis-Chalmers Company, but none are of very large proportions. At Oshkosh, the A. W. Schram & Sons Company is increasing its power and manufacturing facilities. In Portage preliminary arrangements for the location of a plant there by the B. F. Freeland & Sons Company, Sturgis, Mich., have been concluded.

The new plant to be built by the Sterling Wheelbarrow Company will be located at Sixty-third avenue, in West Allis. It will be a fireproof building of mill construction, the initial expenditure to amount to \$35,000.

Steam power is to be installed by the Waitsburg (Wash.) Electric Light Company as an auxiliary to its hydro-electric plant.

The International Sand Lime Brick Company, Portage, Wis., is purchasing machinery for its plant.

A Dake engine has been sold to the Grays Harbor Commercial Club, Cosmopolis, Wash., which is said to be contemplating the purchase of considerable machinery in the near future.

The Simmons Mfg. Company, Kenosha, Wis., is buying motors for operating its machinery. The facilities are being gradually extended.

Chicago Machinery Market.

CHICAGO, ILL., May 25, 1909.

More positive evidence of improvement in machinery lines is discernible than at any time in several months. Although interrupted by stops and starts, it was plain enough that the general volume of business has been growing since the first of the year, but the full extent of improvement has scarcely been realized. Starting about the first of May, the demand has been characterized by a stronger impetus, the beneficial effect of which has been felt in many lines; particularly in this true of machine tools. Practically all of the machine tool houses report a marked increase in buying which in some cases has reached proportions closely approximating what might be expected under entirely normal conditions. It was stated by one of the leading houses that if its business for the remainder of the month held its present average the record would fall not far short of that established during the busy period of 1907. This is all the more significant since the railroads and industries closely associated with them have contributed very little to the result. An examination of the sources of demand discloses the fact that by far the greater proportion of it still has its origin in the requirements of manufacturers of agricultural implements, automobiles and automobile accessories and gas engines. At the same time other machine tool users are beginning to come into the market, and several prospective orders from the larger establishments are in sight. There are pending an order for new equipment amounting to \$50,000 and

another for supplementary equipment of \$15,000, both of which will likely be included among the early purchases. While, as has been the case for many months, small orders for single tools predominate, yet larger orders are more frequent. Included in the sales of one concern were 12 good sized milling machines, half of which were purchased in one lot. If to the present demand there should be added anything like the amount of business that normally comes from the railroads, there would be left no ground for complaint as to the volume of trade.

There is every prospect of a large attendance at the meeting of the National Machine Tool Builders' Association, to be held in Milwaukee May 25 and 26. Practically all of the Chicago interests in this line will be well represented, and an interesting meeting is anticipated.

A new sheet metal and tank shop has been established at Salem, Ore., by E. K. Anderson. Steel furnaces and pneumatic pressure tanks will constitute the leading lines to be manufactured for which suitable machinery has been installed. There is still to be purchased a rotary splitting shear, riveting machinery and air compressors.

The order for machine tools required to equip a large addition to the plant of the Dake-American Steam Turbine Company, Grand Rapids, Mich., was secured by McDowell, Stocker & Co., Chicago. Among the tools included in this lot were 9 millers, 5 lathes, 2 boring mills, an 8-spindle drill press, 3-speed lathes and 1 low swing lathe. These improvements will considerably more than double the present capacity of the plant.

The E. L. Essley Machinery Company, Chicago, is now established in new quarters in the Edgecomb Building, 67 West Washington street. This company recently purchased the entire equipment of the Remington-Shoals Typewriter Company's plant, which was sold at public auction. The value of the machinery included in the sale was approximately \$18,000, and most of it was distributed from the plant by the purchaser without removal.

As indicating the measure of recent improvement in machinery sales, the Chicago Pneumatic Tool Company reports that thus far its business for May is practically double that of the same period of last year. Among the orders received are several, which include a large number of pneumatic tools. Its shops at Cleveland and Detroit are running practically full, and the urgency for prompt deliveries is becoming more marked.

The Michigan Power Company, Lansing, Mich., has improvements in contemplation which call for the installation of a 2500-kw. steam turbine unit, together with condenser and auxiliaries, and two 400-hp. boilers complete with chain grates. The company will also construct transmission lines from Lansing to Pottersville, Charlotte, Bellevue and Olivet, at which points substations and distributing systems for public and commercial lighting and power purposes will be installed. W. H. Zimmerman is general manager.

The construction of a water works and electric light plant and the installation of new ice making machinery is contemplated in plans under consideration by the Union Light & Ice Company, Hubbard City, Texas. It is proposed to issue 6 per cent. bonds of \$100,000, to be taken by the contractor undertaking the work.

J. E. McElligatt, general superintendent of the municipal light and water works, Worthington Minn., writes that the city is considering the installation of a small generating unit.

The Coleman-Fulton Pasture Company, Gregory, Texas, is contemplating the installation of an electric light plant with sufficient capacity to furnish electricity for 1000 lights, and possibly for a few small motors.

Cleveland Machinery Market.

CLEVELAND, OHIO, May 25, 1909.

The general outlook in the machinery market is better than it has been at any time the past year. While the improvement in orders is coming very gradually, the market has broadened materially and the effect is noticed by the builders of nearly all lines of machinery. The improvement is slower in heavy handling machinery, but the prospects for a better demand for that class of machinery are encouraging. In heavy power equipment not much business has been placed in this territory recently, but some pending projects under consideration are expected to result in the placing of some fairly good orders before long. Machine tool houses report a slight improvement in the volume of orders the past week, but these were largely for single tools. Nearly all report that inquiries are coming in somewhat more freely.

There is a good demand for second-hand tools, but machinery houses have only small stocks on hand and are anxious to pick up good used tools.

Local machine tool builders report that orders are getting more plentiful and that the aggregate of their May sales will be very satisfactory when compared with the previous months. There is an improved demand for automatic machinery, steam and drop hammers for forging

plants, punches and shears and other lines of machinery. Machinery plants are adding to their working forces from week to week and all first-class machinists can readily find employment.

In the foundry trade the demand for light gray castings continues fairly good and many plants are running at from 75 to 85 per cent. of their full capacity. The demand for heavy castings is still light.

The Muehlhauser Machine Company, Cleveland, has been incorporated with a capitalization of \$15,000, to manufacture automobiles. The company has purchased a site on Hamilton avenue, adjoining that of the Machinery Forging Company and will erect a factory, 36 x 120 ft. The company will soon be in the market for considerable machine tool equipment for automobile work. M. W. Muehlhauser is president and manager, and H. S. French of the Machinery Forging Company is secretary and treasurer.

The Lake Erie Forging Company, now located at 4922-4926 Hamilton avenue, Cleveland, has secured a site at Scranton avenue and University road, where it will erect an up to date forging plant that will enable it to largely increase its present output and to add new lines. The company makes a specialty of forged blanking dies and weldless tool steel rings, together with machinery and automobile forgings. It will erect a one-story building, of forge shop construction, 40 x 100 ft. Some new machinery will be installed, including one or more steam hammers. The plant will be ready for occupancy in June. The Lake Erie Forging Company was formed only a little more than a year ago, and since its plant began operations its business has grown very satisfactorily. J. A. Markley is president and manager.

The Metal Blanks Company, Cleveland, recently incorporated with a capitalization of \$15,000, has established a plant at 5407 Euclid avenue for the manufacture of all kinds of metal blanks. F. H. Morse is president and H. M. Snider, secretary and treasurer.

The Cleveland office of the Allis-Chalmers Company has received an order from the White Sulphur Stone Company, White Sulphur Springs, Ohio, for a No. 7½ Gates stone crusher.

The Niles Car & Mfg. Company, Niles, Ohio, has received an order from the Washington, Baltimore & Annapolis Railroad for 29 electric coaches, which will keep its plant busy for the next two months.

The Cleveland office of the Waterbury Farrel Foundry & Machine Company reports a market improvement this month in the demand for its line of machinery.

The Board of Trustees of the Girls' Industrial Home, Delaware, Ohio, will receive bids on June 15 for a cold storage and ice manufacturing plant for that institution.

The P. A. Geier Company, machinist, Cleveland, has increased its capitalization from \$10,000 to \$15,000.

Cincinnati Machinery Market.

CINCINNATI, OHIO, May 25, 1909.

Considerable impetus was given the machine tool and general machinery trade in this section last week through the visits of the foundrymen, superintendents of plants, managers and supply men, &c., at the convention of the allied organizations. As a result of the experiment made by the Lodge & Shipley Machine Tool Company, a representative member of the "Bix Six," who had a large engine lathe in exhibition hall, the tool men will undoubtedly be represented at Detroit next year, and doubtless other machinery manufacturers will follow. Some splendid sales of furnaces, molding machinery, &c., were made during the exhibition, and a number of important purchases of tools made by the exhibitors themselves through visits made to local tool manufacturing plants. The week was important also from a manufacturing viewpoint in the evidences presented at many establishments of a return to normal conditions in time and wages.

The Lodge & Shipley Machine Tool Company reached its normal mark in the payroll; also the John Steptoe Company. The J. H. Day Company, manufacturer of bakers' and confectioners' machinery, &c., restored the wages of its 400 employees, which were cut from 2 to 3 cents per hour during the depression. This company reports business conditions improving at a rapid rate. Conditions at the Cincinnati office of the Cincinnati branch, National Metal Trades Association, are an especially good index of these improving conditions. Requests for skilled labor are accumulating and the employment department of the office, which is now located on the Seventh street side of the Odd Fellows' Temple Building, is taxed to supply the demands from the numerous tool establishments in the territory. The dealers report much better business, and some inquiries, which include fair sized lists of tools, are in negotiation.

Tool manufacturers are greatly interested in the reports, many of which are substantiated, that three or four large automobile plants are to be built in this field at an early date. The greater number of these establishments will re-

sult from experiments which have been under way at large carriage manufacturing plants for some time.

The first complete plant to be announced, belonging to this class, is that now under way on Evans street, Cincinnati, by Haberer & Co. It is to be finished before August 1, and is to be of concrete, six stories in height with 200,000 sq. ft. of floor space. Three types of medium price autos will be made—a roadster, a touring car and a baby tonneau.

The American Safe & Lock Company has been incorporated at Cincinnati by Frederick W. Baum, F. William Goeddel, George W. Rhein, Catherine Baum and J. A. Rhein, to manufacture fire and burglar proof safes and locks. The plant will be located at 206-212 Lawrence street, and the preliminary incorporation is for \$25,000.

Information from Newark, Ohio, states that the Wehrle Company, whose plant was recently damaged fire, is gradually restoring its work schedule and forces.

William F. Chamberlain is conducting the business of the Dayton, Ohio, Hydraulic Company as receiver, this action having been taken a few days ago at the request of President O. O. Ozias, who averred that debts amounting to \$175,000 could not be paid off at this time, although the company was thought to be perfectly solvent. A reorganization of the company is said to be a certainty. An inventory and appraisal of the holdings is being made by Virgil Z. Brooks, William B. Patterson and Hugh M. Walsh.

The Heisler Mfg. Company, St. Marys, Ohio, will build a large pumping engine of the gross compound Corliss type for installation in the Bridgeport Brass Company's works at Bridgeport, Conn. The unit will be designed to pump against a water pressure of 120 lb. to the square inch and will be used to operate hydraulic drawing presses which draw out seamless brass tubing in sizes from ½ to 6 and 8 in. in diameter.

A new clothes line which is said to do away with the necessity of fasteners for the drying clothes has been invented and will be put on the market by the Pinless Clothes-line Company, Columbus, Ohio, whose officers are: Wilbur DeMeres, president; John B. Baas, vice-president; W. D. Bresnahan, secretary, and Adam Vogel, treasurer.

With a view to carrying out extensive plans for the enlargement and improvement of the plant of the Berger Mfg. Company, Canton, Ohio, the directors have approved an increase of the capital stock from \$2,000,000 to \$5,000,000. A meeting of stockholders has been called to ratify the action.

Unofficial reports from Linton, Ind., say that the old Shirley Hill mine No. 1, recently abandoned, will be re-opened and equipped with a full equipment of modern machinery.

The Bass Foundry & Machine Company, Ft. Wayne, Ind., secured the contract for the new boilers to be installed in the new city lighting plant at Huntington, Ind., and the Ft. Wayne Electric Company will furnish the dynamos.

The Lane & Bodley Company, Cincinnati, builder of heavy duty Corliss engines, reports business conditions rapidly improving. The company is particularly pleased over the reception given its new single eccentric heavy duty Corliss type, which was shown at the exhibition in connection with the recent foundrymen's convention.

Philadelphia Machinery Market.

PHILADELPHIA, PA., May 25, 1909.

A fair volume of new business crops out, but there is no aggressive forward movement to be noted. The most important matter before the trade is the proposed equipment for the new machine shop of Henry Disston & Sons, Inc., the orders for which are expected to be placed almost any day. With the exception of this business no propositions of any large size, that are expected to result in early orders, are before the trade. There is a moderate volume of day to day business, mostly for single tools. Milling machines continue to be the most active, while a good share of business has been done in lathes and drilling machines. The gradual betterment of the steel mills is encouraging to the trade, although an early increase in the demand from this direction, as far as machine tool equipments are concerned, can hardly be expected, although the fact that conditions in the iron and steel mills are more active leads to improvements in other directions, which are directly beneficial to the machine tool trade. The railroads have been somewhat more active purchasers of rolling stock and motive power equipment, but builders of cars and locomotives are still far from active. Ship builders in this territory are more encouraged with the outlook for business; orders for several vessels have been placed, while several interesting propositions are being figured on by the various yards. Manufacturers of special tools and machinery report a slight improvement in the demand, although orders are still irregular. Boiler makers are comparatively active; engine builders, however, are not very fully engaged, and there is sharp competition for what business is offered.

Second-hand machinery merchants note a slight falling

off in the demand, but as the market has been more or less irregular for some time, the present quietness is believed to be only temporary. The demand for second-hand boilers and engines has not been active; some business has been done in small and medium horsepowers, but the larger capacities are dull.

A slight betterment is noted in the foundry trade. The demand is still irregular, however, and improvements are largely in special lines. The demand for castings from the textile machinery makers continues active. The general jobbing trade has been taking a somewhat better tonnage, but the larger steel casting plants still continue rather inactive. The situation on the whole is still unsatisfactory.

Plans have been prepared by Philip H. Johnson, architect, Land Title Building, for a coal pocket, ambulance building, tunnel ventilators and other improvements to the Municipal Hospital for the city of Philadelphia. Specifications may be obtained from him.

The Espen-Lucas Machine Works reports a somewhat better volume of business. The demand has been largely for cold saw cutting off tools and boring and drilling machines, for which several satisfactory orders have been recently taken. Shipments during the current month have been quite numerous and the outlook is believed to be more hopeful.

The Baldwin Locomotive Works denies, through one of its leading officials, the recent reports that heavy purchases of machine tools and machinery for its Eddystone plant were to be made, no extensions whatever being in contemplation at this time. This concern has recently taken an order for 10 locomotives for the Northern Pacific Railway and reports a better volume of inquiries, so that its view of future business is somewhat more encouraging.

The American Pulley Company notes a slight betterment in the demand; orders are still rather irregular, however, and individually small, covering to a large extent only current needs, buyers not being inclined to stock up heavily. In the aggregate orders this month show an improvement over those for March. The export business in pulleys moves rather slowly. The foreign trade, as a rule, is buying lightly, and while shipments for export are numerous, they are rather small individually.

The Philadelphia & Reading is asking for further bids for work in connection with its elevated work. Under contract No. 9, proposals will be received for masonry, trestle and embankment work, from Seventeenth and Indiana streets to Tioga street. Contract No. 10 covers the same class of work from Tioga street to the company's Richmond Branch, while contract No. 11 covers bridges ready for ballast, covering both sections above referred to. These contracts embrace a new section of the work of elevation of the crossings on the Philadelphia, Germantown & Norristown Branch, for which bids will be received until June 15. Plans and specifications may be obtained from W. Hunter, chief engineer, 520 Reading Terminal.

The Hale & Kilburn Mfg. Company has placed a contract with John G. Brown, Witherspoon Building, for the erection of a five-story addition, 100 x 195 ft., with a wing 100 x 150 ft., to its present plant. The building is to be of reinforced concrete, and will be used for a metal manufacturing department, relieving other congested portions of the plant. While the requirements in the way of new tools and power equipment have not been fully decided upon, quite a considerable quantity will be needed.

New England Machinery Market.

BOSTON, MASS., May 25, 1909.

The machine tool builders are feeling the improvement in business to a greater extent than the dealers, because a large proportion of new orders booked come from outside of the New England territory, especially the Middle West. A number of important shops have gone on full time, including most of the large Worcester works, which had not previously shared in the growing demand for machinery, but not all of them are employing their full forces of men. The best class of mechanics are becoming scarcer. The daily newspapers are printing advertisements inviting local machinists to apply for work to representatives of manufacturers, usually located in other centers. There does not appear to be an equal proportionate distribution of the best men, for they are less rare in some places than in others. In Boston there are still a good many idle men, according to the experience of the labor bureaus, but hardly a good all round mechanic can be found among them, and the same report comes from Worcester, Springfield, Hartford, Lynn, Waterbury, Bridgeport and New Haven. Quick deliveries of machinery are demanded by buyers, a fact that has diverted a number of orders from machine tool builders, whose product had been preferred. The dealers have had a satisfying week, there being no let up in the average improvement in business. Woodworking machinery is in less active demand, but this is a seasonable condition, the trade doing its best buying earlier in the year, in preparation for the season of manufacturing builders' inside finish.

The tool steel dealers report that customers are buying in larger lots, with resulting increase in the volume of business. Only large buyers are conspicuous in the regular steel trade, and they are seeking to make their annual contracts at the most advantageous prices. Every one is now convinced that the market has struck bottom. The merchants are not anxious to dispose of stocks secured by them at low prices, and are even advising larger customers to place their contracts direct with the mills.

The great activity in the automobile trade is reflected in the demand for machinery for garage repair shops, augmenting existing equipment or supplying tools for new establishments. The modern garage is growing in size and therefore in its importance as a buyer of machinery. A typical modern garage is to be built in Cambridge, Mass., for D. P. Nichols & Co., Boston and New York, to be 50 x 177 ft., four stories.

Statistics of industrial expansion in New England, represented by new building, show that the expenditure of \$54,000,000 is already provided for in contracts let or plans decided upon. This does not represent the totals for 1909, for it is known that other manufacturing projects are contemplated. But the \$54,000,000 is more than double the total of 1908, and is said to be ahead of other recent years. A large percentage of the new construction is for the textile mills, which again brings up the subject of this business as a source of profit for the machine tool trade. The supply dealers are well aware of this market, of course, but the machine tool men, as a rule, have neglected it, largely because of the small interest which textile manufacturers have shown in the equipment of their repair shops. Increase or improvement of facilities in this important department of their mills has been avoided, except when it has been absolutely necessary. But of recent years there has come an increasing realization of the economy which must attend the use of modern metal working machinery. The great textile centers might be a source of profitable missionary work on the part of the dealers. Fall River and New Bedford, Mass., will contain a large percentage of the projected enlargements in this industry, and the initial effort would probably be best directed in those cities. Lawrence, Mass., has a noteworthy example of a modern repair shop in the great Wood Worsted Mills, among the largest of the kind in the world, and the influence of such a model shop has been felt throughout the Merrimack Valley. Those supply dealers who also carry machine tools have profited by their acquaintance with the textile people, for even where a mill does not care to buy new machinery the opportunity may frequently arise of disposing of second-hand tools.

The real estate and equipment of the Portsmouth Forge Company, Portsmouth, N. H., will be sold at auction June 15. The machinery includes a number of almost new heavy tools, among them high speed lathes, steam hammers, axle lathes and cold sawing machinery. The business is the outgrowth of the Eastern Forge Company, Nashua, N. H., which was reorganized and moved to Portsmouth a few years ago.

The Chapman Gravity Spindle Company has purchased a tract of land at Winchester, Mass., and plans to erect a large factory on the site for the manufacture of spindles for textile machinery. Charles H. Chapman, Winchester, is the head of the new corporation.

The new Slack Mfg. Company, Springfield, Vt., will build the machine recently brought out by the Colton Combination Tool Company, Easthampton, Mass., and described in *The Iron Age* of December 31, 1908, known as the abrasive metal cutter. The tool performs the same function for high speed steels that the power hack saw does for ordinary tool steels, the cutting agent being a thin abrasive wheel.

The Winchester Repeating Arms Company, New Haven, Conn., manufacturer of firearms, is to build an additional factory, 60 x 280 ft., two stories.

McColley & Brown, Winchendon, Mass., chair manufacturers, are to build a new shop 40 x 120 ft., two stories.

The Lionel Mfg. Company, 381 Broadway, New York, has established its factory in a part of the building of the Pfleghar Mfg. Company, Winchester avenue, New Haven, Conn., where it will manufacture electrical toys, including electric railroads. J. S. Cohen is the president and Victor Scharpf, treasurer of the corporation.

The Household Granite Tub Company, New Haven, Conn., manufacturer of laundry tubs, will erect a new plant at Fair Haven, a suburb of New Haven. The main building will be of brick, with 16,000 sq. ft. of floor space. When the works are occupied all kinds of cement specialties will be made in addition to the present line. The New York office is in the Monolith Building, 45 West Thirty-fourth street. The company states that it has not made up its list of machinery requirements.

The C. J. Root Company, Bristol, Conn., manufacturer of wrought brass hinges and counting machines, will erect a new factory building, 42 x 99 ft., and three stories, together with a power house, 31 x 34 ft. The company states that it expects to buy a boiler and engine, and the latter may possibly be direct connected with generator. An automatic sprinkler system will probably be installed.

The North & Judd Mfg. Company, New Britain, Conn.,

manufacturer of harness hardware, will add an ell, 25 x 30 ft., to its malleable iron foundry, in which will be located a new and larger size air furnace for melting malleable iron.

The Worcester Pressed Steel Company, Worcester, Mass., manufacturer of pressed metal goods, has prepared plans for a new manufacturing building, which will probably be erected this summer. The structure will be 90 x 104 ft. and two stories. The company has just bought four heavy presses, and purposes to add others later in the season, but not before autumn. The works are very busy, operating to maximum capacity.

The Alaska Freezer Company, Winchendon, Mass., manufacturer of ice cream freezers, is to build a new factory, 48 x 120 ft., and three stories. The building will be used for manufacturing, the old structure to be devoted exclusively to storage. The company states that it will require no new equipment at this time. The business has grown rapidly, the company being one of the few which has felt no effect from the industrial depression.

The Automatic Machine Company, Bridgeport, Conn., has recently added to its line of gasoline engines, stationary engines and small direct connected lighting units, which are built up to 150 hp. The company has made a specialty of marine engines, and this business for the first four months of the year has been larger than ever before. The third carload of the year is now being shipped to the company's branch house at Seattle. The machine tool branch of the business is gradually picking up.

The Capitol City Novelty Company, 401 Trumbull street, Hartford, Conn., has been incorporated to produce a new gas heater and other novelties to be developed later. The company will contract the manufacturing at present, simply taking the sales end of the business.

The Chelsea Gas Light Company, Chelsea, Mass., has voted to consolidate its gas business with that of the East Boston Gas Company, this action following the sale of the Chelsea Company's electric business to the Edison Electric Illuminating Company, Boston.

An excellent indication of the widespread confidence in the industrial outlook is the rapidly increasing number of plans for new manufacturing enterprises and for the extensions of existing works. There is hardly an exception among the various lines of product, the woolen business being the only case where complaint is heard, this applying to straight woollens and not to worsteds. Among the latest announcements of new building are the following: Powers Paper Company, Holyoke, mill at Brightwood, suburb of Springfield, 206 x 300 ft., three stories, with power plant to develop electricity, all machinery to be equipped with individual motor drive; sprinkler system, plunger elevators, exhaust system of ventilation, 60,000 gal. steel water tank; American Paper Goods Company, Kensington, Conn., additional story to factory, 42 x 180 ft.; British Hosiery Company, Thornton, R. I., new factory at Providence, 51 x 160 ft., six stories; A. B. Clark Company, Peabody, Mass., sheepskins, new factory to replace that recently burned; George H. Gilbert Mfg. Company, Ware, Mass., textiles, electric power plant, to replace steam power in two of the mills; Corr Mills, East Taunton, Mass., textiles, weave shed to house 1000 looms; Parkhill Mfg. Company, Fitchburg, Mass., textiles, mill 120 x 300 ft., four stories. The mills of the Holmes Mfg. Company, New Bedford, Mass., now organizing with \$1,200,000 capital stock, will be new throughout, including power plant and machine shop. The enterprise is a large one, for 55,000 spindles will be installed in the beginning.

Government Purchases.

WASHINGTON, D. C., May 25, 1909.

The Isthmian Canal Commission will receive bids until June 14, Circular No. 512, for centrifugal pump and engine, portable rock crushing plant, gasoline motors, electric hoist, machine shop machines, &c.

The Bureau of Yards and Docks, Navy Department, Washington, will receive bids until June 26 for pumps, condensers, heaters, &c., for the central power plant at the Puget Sound Navy Yard.

The Bureau of Yards and Docks, Navy Department, Washington, will receive bids until June 26 for three 5000 cu. ft. air compressors and accessories for the New York, Philadelphia and Mare Island navy yards.

The Bureau of Yards and Docks, Navy Department, Washington, will receive bids until June 26 for eight boilers with oil burners, flues, superheaters, &c., for the Puget Sound and Mare Island navy yards.

Bids will be received until June 15 at the office of the Constructing Quartermaster, Fort Leavenworth, Kan., for power plant equipment for the military prison.

The Constructing Quartermaster, Fort Hamilton, N. Y., will receive bids until June 15 for the construction of an electric lighting system and substation at the post.

The Treasury Department, Washington, D. C., will receive bids until June 9 for an artesian well and pumping plant for the post office and court house building at Columbus, Ohio.

The Isthmian Canal Commission will soon ask bids for one condenser, air and circulating pumps, two 2000 gal. pumps, including motor, one screw cutting lathe and other supplies.

The following bids were opened April 26 at the office of the United States Engineer, Boston, Mass., for boilers, generators and engines for the forts at Stevens, Ore., Casey, Wash., and Scott, Cal.:

A, Fort Stevens; B, Fort Casey; C, Fort Scott.

Boilers.

Bidder 1, Mosher Water Tube Boiler Company, New York, including installation—A, \$5527; B, \$6605; C, \$8555; not including installation—A, \$3842; B, \$4411; C, \$5682; total with installation, \$20,686; total without installation, \$13,935.

2, E. Keeler Company, Williamsport, Pa., including installation—A, \$4788; B, \$5502; C, \$7088; not including installation—A, \$3798; B, \$4292; C, \$6940; total with installation, \$17,398; total without installation, \$15,050.

3, Heine Safety Boiler Company, St. Louis, Mo., including installation—A, \$5750; B, \$6600; C, \$8885; not including installation—A, \$4765; B, \$5635; C, \$7260; total with installation, \$21,235; total without installation, \$17,660.

4, Babcock & Wilcox Company, New York, including installation—A, \$6458; B, \$8170; C, \$9959; not including installation—A, \$4874; B, \$6157; C, \$7797; total with installation, \$24,587; total without installation, \$18,828.

Generators.

Bidder 1, Allis-Chalmers Company, Milwaukee, Wis.—A, \$2015; B, \$2345; C, \$2845; total, \$7205.

2, Diehl Mfg. Company, Elizabethport, N. J.—A, \$2190; B, \$2806; C, \$3248; total, \$8244.

3, Fort Wayne Electric Works, Fort Wayne, Ind.—A, \$1773; B, \$2159; C, \$2766; total, \$6698.

4, General Electric Company, Schenectady, N. Y.—A, \$2972; B, \$3490; C, \$2983; total, \$7645; alternate bid A—A, \$1740; B, \$2063; C, \$2516; total, \$6319; alternate bid B—A, \$2017; B, \$3532; C, \$2959; total, \$7508.

7, Hallidie Machinery Company, Seattle, Wash.—A, \$2219.70; B, \$2945; C, \$3207.75; total, \$8372.45.

8, Western Electric Company, New York—A, \$1656; B, \$2192; C, \$2811; total, \$6659.

9, Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.—A, \$1732; B, \$2192; C, \$2797; total, \$6721; alternate—A, \$1630; B, \$2062.60; C, \$2637; total, \$6329.60.

11, Sprague Electric Company, New York—A, \$1960; B, \$2600; C, \$3364; total, \$7924.

Engines.

Bidder 1, Ames Iron Works, New York—A, \$2970; B, \$3676; C, \$4915; total, \$11,561.

2, Hall Engine Company, Seattle, Wash.—A, \$3080; B, \$3689; C, \$4647; total, \$11,416.

3, Buffalo Forge Company, Buffalo, N. Y.—A, \$2177; B, \$2865; C, \$3985; total, \$9027.

4, Erie City Iron Works, Erie, Pa.—A, \$2320; B, \$3040; C, \$4111; total, \$9471.

5, Erie Mfg. & Supply Company, Erie, Pa.—A, \$3000; B, \$3600; C, \$4600; total, \$11,200.

6, A. D. Granger Company, New York—A, \$2230; B, \$3190; C, \$3970; total, \$9390; alternate—A, \$2790; B, \$4730; C, \$4730; total, \$11,140.

8, Hallidie Machinery Company, Seattle, Wash.—A, \$2709; B, \$3662.75; C, \$4134.45; total, \$10,506.20.

9, A. L. Ide & Sons, New York—A, \$2699; B, \$3406; C, \$4326; total, \$10,431; alternate—A, \$2699; B, \$3406; C, \$4326; total, \$10,431.

11, Phoenix Iron Works, Meadville, Pa.—A, \$2850; B, \$2850; C, \$500; total, \$11,700.

12, Skinner Engine Company, Erie, Pa.—A, \$2658; B, \$3202; C, \$3774; total, \$9634.

The following bids were opened May 18 for machinery for the navy yards:

Class 11.—One hoisting crane—Bidder 7, Alliance Machine Company, Alliance, Ohio, \$3645; 22, Brown Hoisting Machinery Company, Cleveland, Ohio, \$3010; 53, Cleveland Crane & Engineering Company, Wickliffe, Ohio, \$279; 121, Henshaw, Bulkley & Co., San Francisco, Cal., \$3645; 128, Interstate Engineering Company, Bedford, Ohio, \$2283; 202, Niles-Bement-Pond Company, New York, \$3260 and \$2000; 297, Whiting Foundry Equipment Company, Harvey, Ill., \$9196 and \$2040.

Class 251.—One single spindle automatic screw machine—Bidder 48, Cleveland Automatic Machine Company, Cleveland, Ohio, \$1869.80.

Class 501.—One oxy-acetylene welding and cutting plant—Bidder 26, Davis-Bourneville Company, New York, \$4970.

Under bid opened April 13 for machinery for the navy yards, the B. F. Sturtevant Company, Hyde Park, Mass., has been awarded class 2, two chain ammunition hoist motors, with spare parts, \$764.55.

The following awards have been made for machinery for the navy yards, bids for which were opened April 27:

Pratt & Whitney Company, Hartford, Conn., class 61, one new model engine lathe, \$1450.

Fairbanks Company, New York, class 62, one crank shaper, \$545.

The following awards have been made for machinery for the navy yards, bids for which were opened May 4:

Niles-Bement-Pond Company, New York, class 1, one 40-ton electric traveling crane, \$6430.

Gleason Works, Rochester, N. Y., class 81, one beveled gear planer, \$1530.

The following awards have been made for machinery for the Isthmian Canal Commission, bids for which were opened May 6, Circular No. 503:

Manning, Maxwell & Moore, New York, class 4, one single surface wood planing machine, \$408; class 9, one turret lathe, \$1190; class 10, one turret lathe, \$610.

Oliver Machinery Company, New York, class 5, one universal saw bench, \$397; class 6, one 38-in. band saw, \$294; class 7, one 12-in. joiner, \$305.

Diehl Mfg. Company, Elizabethport, N. J., class 8, one motor, \$250.

Prentiss Tool & Supply Company, New York, class 11, one oilt cutter, \$381.

HARDWARE

AN interesting campaign has for some time been in progress under the conduct of the National Wagon Manufacturers' Association with the object of educating implement and vehicle dealers in business methods and raising the standard of this class of merchants, which it is generally admitted is not of a very high or responsible character. On taking up their business, oftentimes without proper qualifications or experience, implement agents have caused a deplorable demoralization in the business. Implements and vehicles are sold at prices which, while representing a slight advance over the actual cost price, show a positive and considerable loss when expenses, &c., are figured in a business-like way. In the circular correspondence of the association the interesting statement is made that in a majority of instances Hardware merchants who handle the lines referred to are only enabled to continue business because of the profits of the Hardware end. In this connection it may be recalled that the eligibility of implement dealers for membership in Hardware associations was discussed at a number of the recent State conventions, and the excellent suggestion was made that by getting such dealers into the association they could be educated as to costs, business methods, &c., in a way which would result beneficially to the Hardware trade as a whole. The effort of the wagon manufacturers' association is a most intelligent and timely one and commands the support of all who are directly or indirectly interested in this class of trade.

It would be a mistake, however, to assume, while the Hardware merchants of the country compare well in business ability and in up to date methods with those in any other branch of trade, that there is not room for improvement in regard to their business system. One of the things which it is necessary constantly to impress upon merchants is the proper recognition of the cost of doing business, many of them failing to make at all suitable allowance for the general or overhead expenses. This is a matter to which attention has been given from time to time in several of the State conventions, where the discussion of practical subjects of this character constitutes an important part of the usefulness of the association movement. There is, however, need of much more instruction along these lines, especially as a great many merchants have only lax methods of keeping their books and are without the definite information in regard to many details of their business which are regarded as indispensable to the efficient and intelligent management of jobbing or manufacturing establishments. It is not, of course, to be expected that there will be in the small concerns as much system or as elaborate records of the various departments as are found requisite in the great establishments, but this is undoubtedly a matter to which multitudes of Hardware merchants might advantageously give their best attention.

Condition of Trade.

The quiet optimism and cheerful confidence which have been born of recent developments in the general business situation, and particularly in the steel and iron markets, continue to characterize trade sentiment. Tangible effects of improved conditions are still felt more distinctly in the Central and Western States than in the

East, but even the East realizes the change, and conditions in manufacturing centers are not far from normal. In a few lines of production, notably Builders' Hardware, activity is especially marked, and is based on demand of a most substantial and insistent character. Nowhere in the trade is there any disposition to look for rapid expansion, or to exaggerate the encouraging features of the situation. The absence of these unhealthful features augurs well for the permanence and stability of the gradual upbuilding which is going on. Certain it is that the establishments of jobbers and other large distributors are getting busier as the season advances. Many of them report that April was a very satisfactory month. Stocks in the hands of the retail trade are light and require frequent purchases to keep them sorted up to working requirements. Substantial stock orders are much more numerous than two or three months ago. In a general way the market may be described as firm, with some recoveries but with irregularities here and there. Heavy goods, usually the first to reflect weakness, are naturally the leaders in the reaction from the low level. Special concessions on these lines are now infrequent, and a fair volume of business is offered. Carpenters and Mechanics' Tools, however, have not reflected much improvement in demand, although prices are in the main steady. The market for Wire products still holds the interest of the trade, and a good many orders are being placed at the advanced price. The strength of the market in this line as indicated in the general maintenance of prices has a good effect in steadying values of other Hardware products. With improved conditions in trade attention is prominently directed to the crops as having commanding importance in regard to the action of a full tide of prosperity. Fortunately reports are in general encouraging with prospects of a good yield and at good prices.

Chicago.

The recent heavy buying of Wire Nails and Fencing naturally communicated a certain degree of impetus to other lines, but in no sense was it comparable to that inspired by the bargain prices which ruled for a brief period in the commodities named. The quick reaction signaled by the announcement made last week by the leading mills of an advance of \$2 a ton on Wire Nails, Barb and Plain Wire has not thus far been followed by a positive uplift of values in other lines; but a decidedly firmer feeling prevails throughout the market as a result of this action. Manufacturers and jobbers are of late plainly less inclined to make concessions, and the general feeling as reflected in views expressed by experienced observers of market movements is that conditions are distinctly favorable to still further expansion, coupled with better maintenance of prices. It is realized, however, that the future development of trade is dependent in no small measure on the outcome of growing crops in the broad agricultural areas of the West especially, and in a broader sense the country at large. There is fortunately, nothing in the situation as a whole as portrayed in current reports to cause apprehension on this score at present. In some localities, it is true, prospects are not wholly favorable, but such exceptions are not numerous enough to sensibly disturb the balance. Mill prices on Galvanized Sheets have been stiffened somewhat by surrounding influences, although they have not yet reached a point of absolute firmness. The late upward tendency of Spelter, combined with a steady, but moderate, increase in demand, is doubtless responsible for betterment in this direction; at all events concessions

heretofore obtainable are becoming more restricted. Black Sheets handled by the Hardware trade are largely consumed in stove and furnace work, and, since this is naturally the off season in these lines, they are moving slowly. Such goods as are particularly affected by railroad demands lack support from this quarter. The normal consumption of Wood Screws, for instance, has been curtailed by the long continued inactivity of car shops, which are among the largest users of Screws; but even this great industry is not without hopeful indications of busier times ahead.

NOTES ON PRICES

Wire Nails.—It was not anticipated that demand would continue after the 10-cent advance noted in our last issue in the large volume that set in when the price was reduced to \$1.60, base. This reduction stimulated very liberal buying on the part of the large trade especially, but many retail merchants also were prompt in placing orders. The change in price to \$1.70 came, however, as a surprise to some, and not a few merchants found their wants uncovered at the low figure. At the first announcement of the advance business seems to have been checked momentarily, but there soon came a renewed demand of fair volume. This doubtless includes orders from houses who were tardy in purchasing, with some supplementary business from houses who had placed orders at the lower figure. Quotations are steadily maintained, as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers.....	\$1.70
Carload lots to retail merchants.....	1.75
Less than carloads to jobbers.....	1.75
Less than carloads to retail merchants.....	1.85

New York.—There has been a perceptible falling off in demand resulting from the fact that many merchants, who had been buying in small lots at store for some time, purchased carloads previous to the advance in price on May 15. During the past week prices have settled somewhat, and small lots at store are held at \$1.95 per keg, base, with \$1.90, base, procurable in some cases.

Chicago.—While not as great in volume as the phenomenal business realized during the two weeks in which the extreme low prices were in effect, a practically normal tonnage of new business has been entered in the past week since the \$2 per ton advance became effective. Orders are being entered by the leading mills at the new price for shipment within 60 days in amounts not exceeding the buyers' estimated normal requirements for that period. This provision is taken to mean that the mills are unwilling to accept unlimited tonnage at current prices, even on specified orders, which in turn suggest the possibility of a further advance later on. With the heavy tonnage of specifications now in hand the leading mills are now employed at full capacity, and heavy shipments are going forward. We quote as follows: \$1.88, Chicago, in car lots to jobbers, and \$1.93 in car lots to retailers, with an advance of 5 cents for less than car lots from mills.

Pittsburgh.—The advance of 10 cents a keg in prices of Wire Nails has had the expected and desired effect of shutting off new demand to some extent, and this is welcomed by the mills, which had taken about all the orders for Wire Nails on the basis of \$1.60 that they cared to take. It should be noted, too, that makers of Wire Nails are insisting that where jobbers have placed contracts for Wire Nails no change in shipping directions will be made, and that the Wire Nails must be taken out at the point of delivery named in the contract. The object of the mills in enforcing this policy is to make the jobbers take care of their own orders and fill them from their warehouses rather than have the mills do this, which has been the custom in the past. We are advised that a fair amount of new orders is being received at the new price of Wire Nails, which is \$1.70 per keg in carloads and larger lots, Pittsburgh. Shipments of Wire Nails by the mills at present on orders entered prior to the advance are very heavy.

Cut Nails.—In some sections of the country larger orders for Cut Nails are reported, while in others no particular improvement in demand is noted. The market lacks the strength shown in Wire Nails, as concessions of 10 to 15 cents per keg are made from the regular quotation of \$1.80 per keg, base, f.o.b. Pittsburgh, for carload lots.

New York.—The volume of business being done in Cut Nails is very light. Prices have sagged during the week and Nails are held at \$1.95 to \$1.90 per keg, base, for small lots at store.

Chicago.—Trade in Cut Nails shows considerable improvement, being doubtless stimulated by the active buying movement in Wire Nails. It was noted that in the orders received by jobbers for Wire Nails, that accompanying specifications for Cut Nails were in many cases double the size that have been previously coming from the same buyers. Prices, however, have not been formally revised, and though not uniformly held are for this market about as follows: In car lots, to jobbers, Iron Cut Nails, \$2; Steel Cut Nails, \$1.80.

Pittsburgh.—As yet no change has been made in prices of Cut Nails to conform to the recent advance of 10 cents per keg in Wire Nails, and we continue to quote Cut Nails nominally at \$1.80 per keg, base, f.o.b. Pittsburgh, but note that this price is still being shaded 10 to 15 cents a keg and more. Demand is rather light and is nearly altogether in small lots to cover current needs.

Barb Wire.—Demand has fallen off to a large extent since the advance of \$2 per ton on May 15, as was anticipated. New business is in fair volume and mills are making heavy shipments. At the recent advance quotations are as follows, f.o.b. Pittsburgh:

	Painted.	Gal.
Jobbers, carload lots.....	\$1.70	\$2.00
Retailers, carload lots.....	1.75	2.05
Retailers, less than carload lots.....	1.85	2.15

Chicago.—Ordinarily the spring trade in Barb Wire is pretty nearly closed by this time, but owing to the backwardness of the season this year and the hesitation in placing orders that preceded the decline, it has been unusually prolonged. Notwithstanding the heavy buying that immediately followed the cut in prices, it is evident from the amount of new business booked last week that the wants of the trade were by no means satisfied by the purchases then made. The continued demand, though less insistent, is still larger than was expected. We quote as follows: Jobbers, Chicago, car lots, Painted, \$1.88; Galvanized, \$2.18; to retailers, car lots, Painted, \$1.93; Galvanized, \$2.23; retailers, less than car lots, Painted, \$2.03; Galvanized, \$2.33; Staples, bright, in car lots, \$1.88; Galvanized, \$2.18; car lots to retailers, 10 cents extra, with an additional 5 cents for less than car lots.

Pittsburgh.—The advance of \$2 a ton in prices effective on May 15 has shut off new demand to some extent, and this was largely the object sought by the mills when the advance was made. Shipments by the mills on contracts entered prior to the advance in prices are heavy. We quote \$2 for Galvanized and \$1.70 for Painted, f.o.b. Pittsburgh.

Plain Wire.—Conditions in the market for Plain Wire are the same as in that of Barb Wire. Mills are making large shipments on orders taken before the advance and demand shows a proportionate falling off. Quotations per 100 lb. to jobbers in carload lots are as follows, on a basis of \$1.50 for Plain and \$1.80 for Galvanized, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days, the usual price to retailers being 5 cents additional:

Nos.....	0 to 9	10	11	12	12½	13	14	15	16
Annealed.....	\$1.50	1.55	1.60	1.65	1.75	1.85	1.95	2.05	2.05
Galvanized.....	1.80	1.85	1.90	1.95	2.05	2.15	2.25	2.35	2.65

Chicago.—The extremely heavy demand for Fencing naturally called for corresponding purchases of Plain Wire by manufacturers. Since restrictions were placed on the amount of tonnage that would be accepted on individual orders at the low price, the anticipation of future requirements for an indefinite period was forestalled. There is, in consequence, a fair amount of buy-

ing at the new prices now in effect, which we quote as follows: Car lots, to jobbers, \$1.68, base, f.o.b. Chicago.

Pittsburgh.—The advance of \$2 a ton in Plain Wire, effective on May 15, has checked new demand to considerable extent, and this will allow the mills to take on new business at the advance and fill orders taken prior to the higher prices. Shipments are heavier than for some months.

Builders' Hardware.—The Builders' Hardware market is commanding a good deal of attention from the larger buyers. Two phases of the situation are especially noteworthy in that they represent strong influences of a conflicting nature. The first is the fact that the demand for Builders' Hardware has been much better than for other Hardware lines. Most of the manufacturers have been enjoying a good trade, and there is enough business in sight to occupy their normal capacity for some time to come. The other consideration is the increasing strength and aggressiveness of so-called independent competition. Several manufacturers of this class have grown materially even during the past two or three years and have enlarged both the amount of their output and the variety and scope of their lines. As already suggested, the effect of these two influences is directly opposite, and thus while the market has an undertone strength, due to the fact that factories are and promise to continue busy, there is also an element of weakness. It may be expected that in such a situation the stronger and more influential interests will act conservatively, and that earnest efforts will be made to correct any undue irregularity in the market. The extent to which these efforts will be successful cannot, of course, be estimated at this time.

Carpenters' Tools.—Prices on the various staple lines of Carpenters' Tools, including especially Auger Bits, Chisels, Drawing Knives, Squares, Planes, &c., as well as Hammers, Hatchets, Wrenches, &c., are now steady, but business is in disappointingly light volume. For some reason these lines do not as yet seem to respond to the recognized improvement in general trade represented by the increasing volume of business in heavier goods and the greater activity in manufacturing plants as well as in the building and structural trades.

Zinc.—Prices on Sheet Zinc show noteworthy firmness, and the metal shows a disposition to participate in the strength of other metals. The price of Zinc has been low for a long period and conditions are such that a moderate advance would occasion no surprise.

Strap and T-Hinges, Etc.—The market for Wrought Strap and T-Hinges, Butts, &c., is now very steady, and, although prices are low, a fair volume of business is being done, and the situation seems to be fairly satisfactory to the larger manufacturers.

Sash Cord.—The strength of the Sash Cord market, reflecting the moderate improvement in the general business situation as well as the advance in cotton, has recently been referred to in these columns. At the close of last week leading manufacturers of Cotton Braided Cord announced an advance in their quotations of 1 cent per pound. The new level of the market may be represented by the price of about 22½ to 23 cents per pound, base.

Telephone and Telegraph Wire.—Under date of May 19, 1909, the manufacturers issued a revised price-list of Telephone and Telegraph Wire, the revision showing a reduction of ⅓ cent per pound on all sizes, as follows:

Dia. in an inch.	Bdls. per mile.	Weight in pounds per mile.	Weight in pounds per M. feet.	Sizes per B. W. gauge.	List prices in cents per pound.		
					Extra	B. B.	Steel.
0.203	3	590	112	6	4	2½	2½
0.165	2	390	74	8	4	2½	2½
0.148	2	314	60	9	4	2½	2½
0.134	2	258	49	10	4½	3	2½
0.120	2	206	39	11	4½	3	2½
0.109	2	170	32	12	4½	3½	2½
0.083	2	99	19	14	4½	3½	3½

Less than 1500 lb. take ¼ cent. per pound advance. Sizes 8 to 14 inclusive, in ¼-mile coils; size 6 in ½-mile coils.

Sheet Copper.—Sheet Copper was advanced ½ cent per pound, base, to large buyers May 25, 18 cents per pound, base, now representing current quotations to purchasers of moderate quantities.

Wood Screws.—For a considerable period the market for Wood Screws, both Brass and Iron, has not been in an entirely satisfactory condition. The slight irregularities which first occurred were, of course, confined to the very largest trade and special business and were not very generally known. It would seem, however, that the situation has not improved during recent weeks, and the irregularities referred to are more frequently reported. The smaller manufacturers, some of whom do not make complete lines, have probably been the original source of the trouble. Business has been of only moderate volume, and strenuous efforts have been made by some to secure a larger share of what was doing. Other manufacturers, who when times are good usually produce Screws only for their own consumption, have been making more than they could use and have forced them on the market.

List Prices on Brass Goods.—The National Association of Brass Manufacturers held a very successful meeting in Buffalo, N. Y., on the 17th, 18th and 19th inst., during which they adopted the report of the List Committee which has been working on lists for nearly a year and ordered that they be got out in catalogue form and supplied to the jobbing trade as heretofore, going into effect September 1. Some new members were taken into the association and it was decided to hold the next meeting in Detroit, Mich., on August 24 and 25.

Sheet Metal Goods.—Increased firmness is reported in prices on Galvanized Sheets. Conductor Pipe and Eaves Trough are still on a low level, but special concessions are less frequent and the disposition, so demoralizing to the market, to quote low prices whether business was in sight or not, has disappeared. Galvanized Ware is in bad shape, but its recent break seems to have carried it to a level beyond which it is not likely to sag.

Rope.—The Sisal Hemp market has been advancing the past few days upon reports from Yucatan that the market was in control of strong hands. The advance has amounted to more than a cent per pound, and Manila and Istle Hems are stronger and higher in sympathy with the advance in Sisal. While no change has been made in the card price of Rope, the market is stronger and concessions from printed prices are not easily obtained. Some in the trade anticipate higher prices in Rope, and would not be surprised to see demand stimulated by the rising market. Pure Manila Rope of the highest grade may be quoted at 8½ to 8¾ cents per pound, according to quantity and class of trade, but Pure Manila of somewhat lower grade can be bought for from ¼ to ½ cent less. The market on good Sisal Rope may be represented by a quotation of 7 to 7¾ cents per pound. Jute Rope, ¼ in. and up, No. 1, is quoted at 6¼ to 6½ cents, and No. 2, 5¼ to 5½ cents.

Window Glass.—There has been practically no change in Window Glass conditions during the week. Demand continues light, with no particular inducement to buy beyond nearby requirements as far as an advance in price is concerned. Some factories have gone out of operation, and others have resumed work. Quotations for Greater New York, from jobbers' list, October 1, 1903, are 90 and 35 per cent. discount on Single and 90 and 40 per cent. discount on Double Strength Glass. Outside Greater New York discounts are 90 and 40 on Single and 90 and 45 on Double. The American Window Glass Company's discounts on Machine Made Glass, from manufacturers' list, January 1, 1901, are 90 and 40 per cent. on Single and 90 and 40 and 10 per cent. on Double. No orders are accepted by this company for shipment later than July, 1909. Hand operated factories are supposed to be meeting the discounts quoted by the American company.

Linseed Oil.—An advance of 2 cents per gallon in the card price of Oil was announced on May 24, as the result of higher Seed prices. On the 25th inst, Seed advanced 4½ cents per bushel on track at Duluth, so that higher Oil prices are not improbable. Seed has been scarce for some time, resulting in the closing of mills because of lack of supply, and stocks of Oil in crushers' hands are not heavy. Buyers to some extent anticipated recent advances and placed contracts for Oil at previous prices.

Demand is steady, but not heavy. Advanced quotations for 5-bbl. or more are as follows: State and Western Raw, 58 cents per gallon; City Raw, 59 cents per gallon. Boiled Oil is 1 cent advance on Raw.

Spirits Turpentine.—In sympathy with Savannah conditions prices show a net advance in this market of $\frac{1}{2}$ cent per gallon during the week. Demand is confined to nearby requirements, which are moderate. The New York market is represented by the following quotations: Oil Barrels, 41 $\frac{1}{2}$ to 42 cents; Machine Made Barrels, 42 to 42 $\frac{1}{2}$ cents per gallon.

Production of Wire and Cut Nails in 1908.

THE current issue of the *Bulletin* of the American Iron and Steel Association gives the following statistics in regard to the production of wire and cut nails during the past year:

Wire Nails.

The production of wire nails during the year amounted to 10,662,972 kegs of 100 lb., as compared with 11,731,044 kegs in 1907, a decrease of 1,068,072 kegs, or over 9.1 per cent. Steel wire nails only were made in both years.

The following table gives the production of wire nails by States in 1907 and 1908:

States.—Kegs of 100 lb.	1907.	1908.
Massachusetts, Rhode Island and Connecticut	263,487	134,170
New York, New Jersey and Pennsylvania	4,787,311	4,214,681
Kentucky, Georgia, Alabama and Ohio	3,057,620	2,787,140
Indiana and Illinois	2,941,216	2,812,105
Wisconsin and Colorado	681,410	714,876
Totals	11,731,044	10,662,972

Our exports of wire nails in 1908 amounted to 59,381,946 lb., or 593,819 kegs, against 94,503,450 lb., or 945,034 kegs, in 1907. We import very few iron or steel wire nails.

Cut Nails.

The statistics prepared for iron and steel cut nails and cut spikes embrace only standard sizes of nails and spikes cut from plates. They do not embrace railroad and other forged spikes, wire nails of any size, machine made horseshoe nails, cut tacks, or hob, clout, basket, shoe, or other small sizes of nails. Cut spikes are always included with cut nails.

The production of cut nails and cut spikes in 1908 amounted to 956,182 kegs of 100 lb. each, against 1,109,138 kegs in 1907, a decrease of 152,956 kegs, or over 13.7 per cent. The following table gives the production of cut nails and cut spikes by States in 1907 and 1908, iron nails being separated from steel nails for 1908. In 1908 over 67.5 per cent. of the total production was cut from steel plate and a little less than 32.5 per cent. was cut from iron plate.

States.—Kegs of 100 lb.	1908.			1907.
	Iron.	Steel.	Total.	
Pennsylvania	269,730	255,439	525,169	664,998
West Virginia, Massachusetts and Ohio		285,554	285,554	277,982
Kentucky, Illinois and California	40,390	105,069	145,459	166,258
Totals	310,120	646,062	956,182	1,109,138

There has been a steady decline in cut nail manufacture since 1905, the total for that year being 1,357,549 kegs, while for 1906 it was 1,189,239 kegs. In 1908 our exports of cut nails and cut spikes amounted to 15,721,898 lb., or 157,219 kegs of 100 lb., against 15,521,208 lb., or 155,212 kegs, in 1907. Our imports of cut nails and cut spikes are only nominal.

The Kimmel Hardware Company, Wayland, N. Y., has succeeded M. Kimmel & Sons, incorporating for \$25,000, and handling at wholesale and retail Shelf and Heavy Hardware, Stoves and Tinware, House Furnishings, Agricultural Implements, Paints and Oils and Sporting Goods. The incorporators are John Kimmel and Peter J. Kimmel of Wayland and Jacob Kimmel, Cohocton, N. Y.

National Retail Hardware Association.

(By Telegraph.)

WITH a larger number of delegates present than has ever before assembled at any of the preceding meetings held by the organization, the tenth annual convention of the National Retail Hardware Association was opened at Milwaukee, Wis., on Tuesday, May 25.

Nearly 150 Delegates Present.

A striking feature of the occasion and one significant of the recognized power and influence of the central body is noted in the fact that of the 150 delegates accredited to the convention, all but five answered to the roll at the morning session. The attendance from the Southern States, which was unusually full, included delegates from some of the more recently organized State associations, which have not heretofore been represented at these annual gatherings.

The programme for the day began with brief introductory remarks by President A. T. Stebbins, which, after the singing of "America" and the invocation, was followed by an address delivered by John Moss, president of the Milwaukee Merchants and Manufacturers' Association. The address by Mayor David S. Rose, scheduled for the morning, was, owing to the speaker's inability to be present at this time, postponed until Thursday. Several representatives of local Hardware interests greeted the assembly in short talks, which were responded to in a happy vein by former president W. P. Bogardus, who paid a deserved tribute to the generous hospitality shown by the city of Milwaukee.

President's Annual Address.

The president's annual address was delivered at the afternoon session. Reviewing the work of the past year Mr. Stebbins outlined the measures taken for the promotion of the organizations interested and the gratifying success that has attended official efforts put forth to this end. In addition to questions more intimately and directly connected with the aims and purposes of the association, other topics of no less interest but wider scope were considered and valuable suggestions offered for the future carrying on of the work.

Briefly referring to the tariff revision now in progress, a desire for a quick settlement of this disturbing question was expressed, and the recommendation made that the Resolutions Committee take up and consider the advisability of indorsing by resolution the appointment of a permanent Tariff Commission charged with the duty of investigating conditions and recommending to Congress such changes in tariff schedules as circumstances may seem to warrant from time to time.

Treasury Balance \$13,000.

Reports from the secretary-treasurer and various committees, together with an address on mutual fire insurance by Sharon E. Jones, and subsequent discussion of this subject occupied the remainder of the afternoon session. The prosperous condition of the association's finances was exhibited in the treasurer's report, which showed a balance of \$13,000. A proposition to reduce the national membership fee was strongly recommended, and it is expected that such action will be taken. The presentation to President Stebbins of a beautiful gavel of unique design and historic interest was a pleasing incident of the session.

With headquarters and assembly room both under the same roof at the Pfister Hotel, where ample accommodations are provided, there is nothing lacking in arrangements to make the occasion one of notable enjoyment for the delegates and guests of the convention.

An informal reception and luncheon will be given on Wednesday at the Deutscher Club by the Milwaukee Merchants and Manufacturers' Association, and the usual banquet will be held at the Pfister Hotel on Thursday evening. Favored by pleasant weather and the delightful surroundings of a beautiful city, coupled with the extreme hospitality of its citizens, this convention will take rank as one of the most notable held since the inception of the movement.

THE PITTSBURGH CONVENTIONS.

THE programme of the nineteenth annual convention of the Southern Hardware Jobbers' Association, to be held June 9, 10 and 11 at the Hotel Schenley, Pittsburgh, has just been issued. It is of convenient pocket size and very attractively gotten up. Besides the formal programme of the meeting it contains a list of the officers of the association, its Advisory Board and various committees and houses comprised in the membership, and also gives the names of the Pittsburgh General Committee, having to do with the entertainment features.

The programme gives the following topics for discussion at executive sessions: "How far should our loyalty go toward those manufacturers who make resale prices?" by J. A. Summers of the Summers-Parrott Hardware company, Johnson City, Tenn.; "Have combinations and consolidations proved beneficial or detrimental to the jobbers?" by S. St. J. Eshleman of Stauffer, Eshleman & Co., New Orleans, and "Can a manufacturer sell a jobber and retail merchant in the same territory and conserve both interests?" by a member of the association not yet chosen.

On Thursday afternoon there will be a joint session with the American Hardware Manufacturers' Association over which Robert Garland, president of the manufacturers' organization, will preside. At this session formal papers will be presented by manufacturers on the following topics:

Should jobbers be represented by syndicate buyers?

Should manufacturers quote as favorable terms and prices to syndicate buyers as they would to their principals, the jobbers?

Is it treating the manufacturer fairly and honestly to ask him to sell his product under private brands and then demand that he do not sell goods of his own brands to catalogue houses or to retail houses?

Papers on the following subjects will be read by members of the jobbers' association:

What should be the attitude of the jobbers to manufacturers who establish branch houses in competition with the jobbers?

Caution which manufacturers should use in quoting jobbers' prices to houses not entitled to same.

F. D. Mitchell, 309 Broadway, New York, secretary-treasurer of the American Hardware Manufacturers' Association, has issued a circular in regard to special railroad rates in connection with the joint conventions of the American Hardware Manufacturers' Association and the Southern Hardware Jobbers' Association, to be held in Pittsburgh June 9-11. The Eastern Canadian and New England Passenger Associations have granted a rate of a fare and three-fifths, plus fee of 25 cents, for round trip on certificate plan. The Trunk Line Association has granted a rate of a fare and three-fifths, plus fee of 25 cents, for round trip, on certificate plan, excepting in the State of Pennsylvania where certificate plan arrangement is not operative. In Pennsylvania round trip tickets to the convention will be sold over all points east of Pittsburgh at 2 cents per mile in each direction from June 3-9, good for return trip leaving Pittsburgh up to June 16, inclusive, and are issued simply by application to ticket agents.

So far as the Western Passenger Association is concerned, summer tourists' fares will be in effect to Pittsburgh, and visitors are referred to their local ticket agents for full particulars regarding rates, routes and the time limit of tickets. No reduced rates have been granted by the Central Passenger Association in view of recent legislative action establishing a maximum fare of 2 cents per mile in the States in which its lines operate, nor have any reduced rates been granted by the South-eastern Passenger Association or the Southwestern Excursion Bureau.

York, Vick & Seelke, Lexington, Texas, are erecting a building 54 x 100 ft. for the accommodation of their stock of Hardware, Stoves, Implements, &c., and general repair shop. One-half of the building will contain a blacksmith shop with a full equipment of modern tools and appliances.

Mississippi Retail Hardware Association.

IN our last issue we presented a report of the proceedings of the convention of the Mississippi Retail Hardware Association. Other action taken at the meeting was the adoption of the following report of the Grievance Committee:

1. As regards jobbers and manufacturers selling lumber yards, mills, gins, &c., where the local dealers are their patrons, such action is detrimental to legitimate trade and is unbusinesslike and demoralizing to business ethics.

2. We especially recommend that the attention of the next Legislature be called to the evasion of the law by the peddlers of Stoves, Buggies, Ranges, &c., as the existing one seems totally inadequate to reach these human pirates, who sap the lifeblood out of a county and give back nothing for the money they have, in almost every instance, faked the community out of. We submit the following synopsis of the Oregon Peddler's Law:

Every peddler, whether principal or agent, shall before commencing business in any county of the State, make application in writing and under oath to the county treasurer for the county in which he proposes to make sales, for a county license. Such application must state the names and residences of the owners or parties in whose interest said business is conducted, and the number of horses and vehicles to be used by him. He must also file an affidavit of the quantity of goods, wares and merchandise as are in the county. He shall also make a special deposit with the county treasurer in addition to the license fee. The amounts to be paid for licenses are as follows: Peddler on foot, \$25; peddler with one horse and wagon, \$100; peddler with two horses and wagon, \$150, and peddler with any other conveyance, \$300.

The special deposit required to be made must remain with the county treasurer for 90 days after the license has been canceled or has expired, and is subject to taxes, attachment, execution or claims that may arise under his license, &c.

Violations of the law are punishable by a fine of \$50 to \$500, and from one to six months' imprisonment, or both such fine and imprisonment.

3. We would urge our Railroad Commissioners to turn their attention to securing a low and equitable freight rate rather than a reduction of passenger fare, as that seems to us would bring the greatest amount of good to the greatest number of people, as we all have to pay freight whether we travel or not.

4. We feel it to be a grievance that all Hardware merchants in our State are not members of this association, as it would eliminate some of the rivalry and injustice often harbored among competitors.

5. Your committee's attention has been called to discrepancies in prices on Haying Tools. While this does not affect us so much individually, we feel our obligation to the National Association impels us to mention this in our report, to show our willingness to co-operate with them on all questions affecting the Hardware trade.

6. We feel that some of the privilege tax laws are unnecessary and oppressive. We call especial attention to those governing the sale of Pistols and Cartridges in our State. We submit that the purchase of these articles goes on just the same as before the enactment of this law, yet the local or home dealer is deprived of any profit which might accrue from such sales. Such laws, we hold, tend to build up catalogue house trade at the expense of the home dealer.

7. That all shippers be requested to insert weights and rates in every bill of lading.

8. The parcel post bill is still a menace, and we trust every member will not fail to urge his Senator and Congressman to be ready to fight same at any time it becomes necessary.

9. We believe it will be to the best interests of every member to investigate the Mutual Hardware Insurance feature, as we are convinced it will reduce this particular expense practically one-half.

10. The need of better country roads is so glaring that we only mention it that our organization may co-operate with any movement to better their condition.

The Webb-Adams Hardware Company, Brookneal, Va., has been incorporated with a capital stock of \$20,000, with R. S. Barbour as president; R. E. Adams, vice-president; J. E. Webb, secretary-treasurer and general manager. The company handles Hardware, Buggies, Wagons, Farm Implements, Stoves, Tinware, Roofing, Glass, Paints, Oils, Guns, Cutlery and Blacksmiths' supplies.

The Oregon Hardware Company, Portland, Ore., recently incorporated with a capital stock of \$10,000, will carry a line of Builders' Hardware, Mechanics' Tools, Sporting Goods and Light and Shelf Hardware. The company has opened up with a stock of \$20,000, which will in the near future be increased to \$35,000. C. G. Jennings is manager of the company.

T. L. Childers has recently opened up in the Hardware business at Freewater, Ore.

GEORGIA RETAIL HARDWARE ASSOCIATION.

As noted in the telegraphic report of the first day's sessions, given in our last issue, a most cordial and considerate hospitality was extended by Valdosta, its Hardware interests and the public at large, to the annual convention of the Georgia Association, held in that city last week. The meeting was referred to by the representative of the Mayor in his official welcome as the largest and most important commercial body which had met in the city, and every evidence was given of the sincerity of the welcome extended.

Apart from the official and commercial greetings which were tendered at the opening session, there was the illumination of the streets and a special display of the Fire Department, as well as the features of entertainment referred to below. A most agreeable impression was thus made of the kindness and enterprise of the city and its interest in the convention. To these the attractiveness of the place and its growing commercial importance contributed largely.

The Programme.

The association made no effort to issue an elaborate souvenir volume with advertisements, as do many of the other associations, but was content to have an appropriately printed programme, with list of officers and the matters which should engage the attention of the convention during its various sessions. The practical character of the topics and their wide range is indicated in the following list of subjects discussed or presented for discussion at the various sessions.

"The Usefulness of the Trade Journal to the Hardware Merchants and the Traveling Salesmen," by R. R. Williams.

"Forty Years in the Retail Hardware Business," by James Watt, Thomasville.

"The Best Method of Collecting Farm Accounts and City Bills," by John R. Hall, Moultrie; C. W. Thomas, Griffin; C. M. Tillman, McRae.



"Does It Pay the Retailer to Buy in Large Quantities or Does It Pay to Buy Often?" by R. W. Hatcher, Milledgeville; P. N. Harley, Waycross.

"Is It Fair for the Fence Manufacturers to Sell More Than One Dealer Their Line in the Same Town, of the Same Brand?" by G. W. Woodruff, Winder; J. B. Tillman, Quitman; J. J. Golden, Tifton; R. W. Hatcher, Milledgeville; John Watt, Waycross.

"Should the Ammunition Association Sell the Wholesale Grocers?" by W. W. Robinson, Dublin; Thos. W. Brobston, Atlanta.

"Relation of Salesmen to the Retail Trade," by Col. R. L. Wylly, Thomasville, Ga.

"The Financial Condition of the South To-day and Twelve Months Ago—The Outlook for Business for the Remainder of the Year," by L. A. Dietrich, American Steel & Wire Company, New York City.

"How Proprietors Should Treat Clerks," by W. W. Robinson, Dublin.

"How to Conduct a Retail Hardware Business Successfully," by P. N. Harley, Waycross.

"Should We Allow the Clerks to Do the Buying, or Should the Manager or Proprietor Do It?" by C. W. Thomas, Griffin.

"Relations of Jobber to Retailer," by W. A. Parker, Atlanta; W. D. Krenson, Savannah.

"Parcel Post," by M. L. Corey, Argos, Ind.

"Mutual Fire Insurance," by R. W. Hatcher, Milledgeville.

"The Bankrupt Law of To-day," by R. W. Hatcher, Milledgeville; G. W. Woodruff, Winder; J. J. Golden, Tifton; W. G. Raines, Statesboro.

Some of these subjects were not discussed on account of the absence of the gentlemen appointed to open them or the pressure of other matters on the time of the association. James Watt was unable to attend the convention, and the meeting was thus deprived of what would undoubtedly have been an interesting paper. It was expected also that M. L. Corey, the national secretary, would be in attendance and discuss parcel post, but his presence elsewhere prevented. R. W. Hatcher was ably reinforced in the discussion of Hardware mutual insur-

ance by W. P. Lewis, the secretary of the National and of the Pennsylvania Insurance Companies.

As can readily be understood, the consideration of these topics, some of broad scope and others of distinctly practical interest, furnished a valuable programme for the thorough discussion of which there was scarcely adequate time. The sessions, however, were all of them full of interest and profit.

Delegations from Other States.

The attendance of Hardware merchants from other States was an interesting feature of the convention. The Pennsylvania Association was represented by its efficient secretary, W. P. Lewis, who has been so influential in building up the organization and who, in addition to his advocacy of Hardware mutual insurance with which he is so prominently identified, contributed in a most interesting manner to the deliberations. New York was represented by R. R. Williams, Hardware editor of *The Iron Age*, who came as a formally accredited delegate from the association of that State and conveyed official greetings to the Georgia Association. J. U. Cureton, the new president of the Alabama Association, and Marvin Dowling, one of its most active members, were also in attendance and made brief and felicitous addresses. In addition to these association workers there were present representatives of manufacturers and jobbers from many States. All these elements contributed materially to the success and interest of the gathering.

The Growth of the Association.

The report of E. E. Dekle, secretary-treasurer, was a brief and business-like document, and related principally to the membership of the association and the additions which have been made to it during the year. That there has been a most satisfactory increase in the strength of the organization, both in its regular and honorary membership, is indicated in the following statistics:

Regular and honorary members on roll, May 10, 1908.	75
Regular members to date.....	115
Honorary members.....	55
Total gain in membership, 1908 to 1909.....	95

Mutual Hardware Insurance.

This is a matter to which a good deal of attention has been given by the Georgia Association. While it is not deemed advisable to form at present a State insurance company of their own, there is a good deal of interest in the matter. The advantages of this type of insurance were emphasized by Messrs. Lewis and Hatcher, who were ably seconded by other members who are familiar with the subject. During the present year an earnest effort will be made by means of a special insurance board to bring the matter more practically to the attention of the merchants, and thus give them the advantages of this form of insurance, and at the same time build up the membership of the association. This board consists of C. M. Tillman, T. W. Brobston, W. D. Raines, Z. B. Hamilton, J. J. Gorton and T. E. Green.

Freight Matters.

Complaint was made by several members of the slow adjustment of freight claims by the railroads, and steps

were taken to ascertain the reason and find, if possible, a remedy.

Convention Committees

The following committees having important duties in regard to the work of the association were appointed by the president:

NOMINATIONS.—J. B. Manry, J. D. Pullen, Sam Brown, S. A. Parish and J. R. Hall.

PLACE OF MEETING.—J. J. Golden, Z. B. Hamilton, Mr. Jackson.

GRIEVANCE.—W. W. Robinson, H. C. Briggs and J. B. Tillman.

AUDITING.—C. A. Stewart, W. T. Herring and T. E. Hoghead.

RESOLUTIONS.—J. J. Golden, R. W. Hatcher, A. A. Zuber.

CONSTITUTION AND BY-LAWS.—T. W. Brobston, S. T. Tygart and W. G. Raines.

TO FOLLOW UP RESOLUTIONS.—J. R. Hall, C. M. Tillman and T. W. Brobston.

PROGRAMME COMMITTEE FOR 1909-10.—T. E. Green, R. W. Hatcher and C. M. Tillman.

Address of W. D. Simmons.

A notable address not on the regular programme was made on Wednesday by W. D. Simmons, president of the Simmons Hardware Company. In it was given a singularly clear statement of some of the fundamental principles of finance, and especially of the influences which cul-

The result was that those who listened were given suggestions, some of which they will probably be able to apply in their own business.

The Officials.

The retiring president, C. M. Tillman, made an able opening address, touching clearly and forcibly on important topics in which the association and the trade are interested. He was also active and influential throughout the convention. E. E. Dekle made a fine record as secretary, and in view of his good work and the ability manifested was chosen president for the ensuing year. In his conduct of the meetings he was a most efficient presiding officer, by his promptness and decision securing admirable dispatch of business. The new secretary is C. A. Stewart, whose activities, with those of the other members of the new administration, will, it is hoped, secure a continued increase in the membership and further the usefulness of the association.

As announced in our last issue, the list of officials for the ensuing year is as follows:

PRESIDENT, E. E. Dekle, Valdosta.

FIRST VICE-PRESIDENT, R. W. Hatcher, Milledgeville.

SECOND VICE-PRESIDENT, G. W. Woodruff, Winder.

SECRETARY-TREASURER, C. A. Stewart, Helena.

INSURANCE MANAGER, R. W. Hatcher, Milledgeville.



E. E. DEKLE.



R. W. HATCHER.



C. M. TILLMAN.



T. E. HEREFORD.

minated in the recent financial disturbance. It was a lucid explanation of what is to many an abstruse and to all a complicated and difficult subject. The address was very much appreciated by the large audience who listened to it.

Representatives of Manufacturers and Jobbers.

Many manufacturers and jobbers and their representatives were present at the convention and active in their attentions to the members. Many of these were the traveling salesmen who visit the Hardware merchants of the State and thus have a wide acquaintance with the delegates. Among the houses thus represented were the following: American Steel & Wire Company, which was represented by a large delegation; Pittsburgh Steel Company, Edwin S. Davis; Union Metallic Cartridge Company and Remington Arms Company, John S. Sanders, John T. Jones and H. H. Harris; Sherwin-Williams Company, J. A. Bowman, A. D. Kiser and Harry F. Hinlsh; Lowe Bros. Company, J. R. Miller; Liberty Stove Company, J. W. Bogle; H. J. Waff & Co., E. B. Jackson; E. C. Atkins & Co., W. D. Key; Standard Oil Company, Pittsburgh Plate Glass Company and Benton Mfg. Company. Among the jobbers represented were Simmons Hardware Company, Norvell-Shapleigh Hardware Company, Hibbard, Spencer, Bartlett & Co.; Belknap Hardware & Mfg. Company, J. D. Weed & Co. and Supplee Hardware Company.

Methods of Collection.

One of the most practical and interesting discussions of the convention was in regard to methods to be pursued in the collection of accounts from city and country customers. A number of the merchants contributed to the discussion by a reference to their specific methods, in which there was found to be a good deal of variety.

Entertainment.

For the entertainment of the convention the principal function was the barbecue on Wednesday evening, when by a special train the delegates and visitors were conveyed to Ocean Park, where on the shore of the lake the clubhouse and surrounding grounds afforded an ideal scene for such an outing. Music was furnished by a special band and a sumptuous repast was enjoyed by nearly 300 visitors, including a number of ladies. Return to the city was made about 10 o'clock, after what was unanimously voted a most successful outing.

Another most enjoyable event was the automobile ride given the visitors on Tuesday afternoon. Many of the automobiles of the city were put at the disposal of the convention, and the delegates and their friends, after an imposing parade through the principal business and residence streets, were given a view of the farms and plantations of the country.

Reception Committee.

The Reception Committee consisted of T. E. Hereford of Valdosta, representative of the Belknap Hardware & Mfg. Company; H. C. Briggs, E. L. Robinson of Valdosta; W. R. McLeod of Valdosta, representative of the Supplee Hardware Company, and Col. R. L. Wyly of Thomasville, representative of J. D. Weed & Co. To these gentlemen much credit is due for the efficient manner in which they discharged their graceful but laborious duties, as they were unceasing in their attentions. The chairman, T. E. Hereford, whose portrait is given herewith, a valued and popular representative of the great Louisville jobbing house with which he has been for some time connected, was especially active, and by his good management and energy contributed greatly to the success of the different features of entertainment, while at the

same time he was in touch with all the arrangements for the meeting and constantly on the lookout for the comfort of the visitors. By his cordiality, good management and good nature and his executive ability he made many new friends, and a special resolution of thanks to him was passed by a vote of the convention. The pleasure of the ladies in attendance was very considerably cared for by Mrs. Hereford, who was aided by Mrs. Briggs and other ladies.

Next Place of Meeting.

There was during the convention a good deal of discussion in regard to the next place of meeting, the prominent candidates for entertaining the convention being Rome and Athens. After an animated canvass Rome was selected by a unanimous vote, the precise date to be determined at least 90 days before the meeting. An effort also will be made to have the conventions in the Southern States held at dates which will serve the convenience of those from neighboring States and from a distance who may desire to attend.

Important Resolutions.

The following clear cut and forcible resolutions were adopted at the convention. It will be seen that they relate to a variety of important matters and especially to evils encountered by the merchants of the State which call for correction:

We, the Georgia Retail Hardware Association, in convention assembled, do herewith make the following resolutions and instruct the secretary to incorporate the same in the annual report of these proceedings:

It is the sentiment of this body that there are several evils existing in the trade that demand remedies for the protection of the retail Hardware merchants of the State.

Differentials in Favor of Hardware Merchants.

First among these we will mention the practice of the wholesale trade in selling indiscriminately to small merchants and general stores such lines as Steel Plow Shapes, Loaded Shells and Ammunition, Nails and Barbed Wire, in small lots, at the same price that the Hardware merchant pays in quantities, thus leaving him no advantage in cost over the small merchant, whose practice it is to sell these articles around cost, or at ridiculously close margins. We maintain that there should be a differential in favor of the legitimate Hardwareman on these lines, and that a restricted selling price, based on a sliding scale, that will afford this protection to the Hardware merchant should be adopted. We recommend that the officers of this association take up this matter with the jobbers and manufacturers interested and try to bring about an arrangement that will achieve this end.

Dates of Southern Conventions.

We recommend a closer affiliation with the organizations of Hardware merchants in the various States, and we especially recommend that our delegate to the national convention be instructed to perfect an arrangement with the associations in the Southern States, by which the meetings of these conventions can be held on rotating dates, so that the officers of the national convention and the representatives of the jobbers and manufacturers can attend same in succession, thus adding largely to the success of these conventions and materially reducing the expenses of these officials and representatives.

Legislation for Protection of Merchants.

We urge that every influence be brought to bear on our legislators to pass legislation favorable to the collection of accounts, and in this connection we favor passage of the law covering garnishment, so that recourse can be had on certain classes that make the practice of defrauding the retail merchant out of just obligations. We believe that the present bankruptcy law as it now stands forms a cloak for dishonesty and that it is a breastwork behind which debtors can hide themselves and make action taken against them of no account. We believe that this law has outlived its usefulness and that it should be repealed.

Parcel Post.

We are convinced that the activity of our organization against parcel post should be maintained, and that we should not allow our past victories in this matter to mar eternal vigilance, which will only be the price of triumph over these pernicious measures.

The Sale of Wire Fencing.

We recommend that the wire fence situation, which is reported by some of our members as burdensome by reason of fence manufacturers selling more than one dealer the same brand in a town, be taken up with these manufacturers, who represent the retailing interest, in a spirit of harmony and kindly feeling toward these corporations, as we have assurance that they stand ready to present justice of their side of the situation, and if a better method than now pursued can be presented to them that they will willingly co-operate with the members of this association. We, however, heartily condemn the practice of some manufacturers in selling their product to merchants in other lines when there is a legitimate merchant in the same town.

Convention Notes.

Among the prominent representatives of jobbing interests was H. R. Ousley of the Norvell-Shapleigh Hardware Company, who, as well as the other representatives of the house, was constant in attentions to the delegates.

The capacity of the Valdes Hotel was taxed to its utmost in furnishing accommodations for the visitors, but every effort was made, and very successfully, by the proprietor to secure their comfort. It was, however, necessary for some to room elsewhere.

The address of R. R. Williams, Hardware editor of *The Iron Age*, on Tuesday afternoon was devoted to the usefulness of the Hardware trade papers in general to Hardware merchants, and emphasized the importance of their making use of the information and suggestions which are thus put within their reach. He referred to the pre-eminence of trade journalism in this country and the high position occupied by the journals in the Hardware and iron fields.

There was no formal exhibition of Hardware products in connection with the convention, but several manufacturers had displays in the lobby of the hotel. Among these were Union Metallic Cartridge Company, Remington Arms Company, Standard Oil Company, Burton Mfg. Company, Sherwin-Williams Company and Lowe Bros. Company. Souvenirs were also given out by several manufacturers.

Very warm appreciation of the hearty reception and welcome extended to the association was expressed in a resolution in which special acknowledgment was made of the courtesies of the Elks in giving the use of their hall for the session, of the Ocean Pond Fishing Club for tendering their lake and grounds for entertainment, and of the owners of the automobiles which were placed at the disposal of the members and other visitors, as well as the constant and tireless efforts of the Hardwaremen of the city to make the gathering an unusually pleasant and successful one.

Very general satisfaction was expressed with the style of the Georgia badge. It was referred to as attractive and appropriate and possessing the advantage of being distinctive and bringing out prominently the name of the State. Some of the members were inclined to refer to the very inconspicuous manner in which the names, Alabama and Mississippi, appeared in the badges of those States, being almost lost sight of, they said, on the hasp of the padlock.

The Lesson of 1907.

After an introductory reference to the course of things during the past year, J. W. Butler of the Chattanooga Plow Company, alluded to the existing business conditions and the outlook for the future, as follows:

There is general disappointment now that normal business conditions have not been regained. It is urged that the panic was senseless and without warrant, therefore as soon as the public had time to catch its breath and realize the situation we should have at once swung back into the old order of things.

That we have not done so is now attributed to Congress tinkering with the tariff. Both precedent and experience cast a grave doubt on either theory. There was a cause for the panic; it was not senseless. It was the inevitable consequence of gambling on the future and spending our substance in riotous living. It will always bring a panic, given time.

Panic Was Not Senseless.

The panic of 1873 required six years to restore confidence and bring normal business health to the country. The panic of 1893 exacted the same period; why should 1907 be the exception? However, this is not intended as a gloomy forecast. Refer to your past balance sheets, and I am sure you will find that these six years of restoration were profitable years in your business. They were close years, maybe dull years, years perhaps of small business volume, but this made us careful and watchful. They were the years we learned business, and at the end of each we were gratified at the profitable result. Indeed our disappointment usually comes at the end of a so-called prosperity year, and so I am inclined to view the present slow down, even the panic itself, sudden and uncomfortable as it was, a blessing in disguise. Nor should we forget the good spirit and temper of our people during the trying days and weeks of that crisis. Because of it we may account for the fewer failures and wrecks that followed. It is one of the lessons we should treasure and be proud of. It is worthy of note that the blow of 1907 fell most heavily on stocks, securities, manufactured products and labor. Prices on all dropped like mercury in zero weather. It is equally worth your thought that the cost of living did not lessen, but increased during and since the storm. This is an ominous and significant fact when we consider the vast number of workingmen's families in this country with incomes of less than \$500 a year, and the further fact that the combinations and trusts controlling family supplies were strong enough to maintain prices in the face of abundant harvests, slowing wheels of industry and locked money vaults. There is abundant material, interesting and vital, in this phase of the question for my entire paper, if time permitted. I consider the above fact one of the greatest danger signals that faces the country. It means widespread unrest among the poor people, and unless the cost of living is somehow arrested it will lead to trouble, for I cannot foresee how even the bare necessities of life are to be supplied on the income of the large majority of the working classes. And I wish to congratulate the dealers of Georgia and the members of this convention in particular that you are so close to the agricultural people who were and are so nearly untouched by the late panic. Though not a prophet nor the son of one, I offer this forecast: 1909, 1910, 1911 and 1912 will be years of restoration, sane business years with a steadily rising tide toward normal business health. If we will keep in mind the lesson of 1907 and prudently but energetically push our business we will all declare dividends. And after that—well, the period I have named is long enough.

Disturbances of '73 and '93.

Restoration Years Were Profitable.

Blessing in Disguise.

Increased Cost of Living.

A Danger Signal.

Forecast Ventured.

Relationship Between the Traveling Salesman and Retailer.

Col. R. L. Wylly, Thomasville, representing the long established house of J. D. Weed & Co., Savannah, made an interesting address on the relations between the traveling man and the retail merchant. After a felicitous introduction he spoke as follows:

As necessary as the traveling salesman is to the jobber, so is he to you, gentlemen of the retail trade. He represents the connecting link between you and the jobber; he is, so to speak, the Envoy Extraordinary and Minister Plenipotentiary from the court of the wholesaler to that of the retailer, and as the accredited ambassador of commerce you should accord him the same consideration that you would give to a member of his firm. There should be established

A Strong Bond of Mutual Confidence

between you and the salesman—confidence in him that he will always watch your interest and give you the best prices at his command; an equally strong confidence that you will always give him a strong deal in your transactions with him and not pull imaginary quotations on him to meet.

He is as quick to resent any overcharge made by his house as he is that of a transportation company, and often does he become the medium by which these differences are adjusted to your entire satisfaction. He will warn you of a possible decline as quickly as of an advance. He does not feel that his duty in life consists alone of selling you goods, but will use every honest effort to assist you in making your business a success by bringing to you new ideas and valuable

suggestions by which you can keep step in the march of progress with other successful merchants, and for all this he will render no bill. He only asks that you accord him a willing audience in listening to the merits of his line and giving him your orders when in need of his goods.

Good Will

is considered a business asset, and the good will of the average traveling salesman cannot be too highly valued; though he is faithful to his house he is equally loyal to you, and will guard both interests with the same watchful care.

Won't you admit that you have been the beneficiary of these traveling evangelists of commerce, whose keen business ability, intelligent suggestions and sympathy have helped you in numerous ways and on many occasions. Is it not true that there have been periods in your commercial life when the clouds of failure seemed to hang pretty low, and have you not, after discussing conditions with your traveling friend, received from him such

Words of Sympathy and Encouragement

as gave a silver lining to those dark clouds and as a natural consequence caused you to brace up and soon after realize the sunshine of success. Has he not, on like occasions, after listening to your troubles, become your sponsor in placing before his house your claim for indulgences in past due indebtedness?

So, gentlemen, regard the traveling salesman as your friend who has your interest close to his heart; let the relationship between you and him be close and pleasant, and when so, it will prove of mutual benefit to you both.

Friendship, Love and Truth.

There is a great fraternal order in this country, of which I have the honor to be a member, that has for its motto: Friendship, Love and Truth, represented by three golden links connected one with the other. If I be not deemed guilty of larceny after trust, let the relationship between the traveling salesman and the retail merchant be represented by these golden links connecting him with you and his house, and the motto "friendship for his customer, love for his house and truth his guiding star" in the discharge of his duty to you both.

Toast to the Traveling Man.

There is a little sentiment from Whitcomb Riley in his toast to the traveling man, which to me never grows old. It runs as follows:

Could I drink of the nectar the gods only can,
I would fill up my glass to the brim,
And drink the success of the traveling man
And the house represented by him.
And could I but tincture this glorious draft
With his smiles as I think of him then,
And the jokes he has told and the laughs he has laughed,
I would fill up the goblet again,

And drink to the sweetheart that bade him good-bye.
With a tenderness thrilling as this
Very hour, as he thinks of the tear in her eye
That saddened the sweet of her kiss.
To her, truest of hearts and fairest of hands,
I would drink with all serious prayers.
Since the heart she must trust is a traveling man's,
And as warm as the ulster he wears.

I would drink to the wife, with the babe on her knee,
Who awaits his return in vain,
And breaks his brief letters so tremulously,
And reads them again and again.
I would drink to the feeble old mother, who sits
By the warm fireside of her son,
And murmurs and weeps o'er the stockings she knits
As she thinks of the wandering one.

I would drink to the strangers and friends
Who have met him with smiles and good cheer;
To the welcoming hand that good fellows extend
To the wayfarer journeying here.
And at last when he turns from this earthly abode,
And pays the last fare that he can,
Mine host of the inn at the end of the road
Will welcome the traveling man.

Does It Pay Retailers to Buy in Large Quantities or to Buy Often?

BY R. W. HATCHER, MILLEDGEVILLE, GA.

In discussing this subject it will be necessary to discuss vendors of Hardware in three classes, namely, strictly retail, semi-jobber and jobber. I will devote most of my attention to the strictly retail class, as this comprises the majority of our membership, and refer to the others only collectively.

The position I first assume is that it does not pay the retailer to buy in large quantities. There is one great force recognized throughout the entire sphere of action as an extractor of absolute defiance; and this is necessity—it knows no law. This force does not urge the retailer to buy in large quantities.

A Time Did Exist

in our forefathers' day when lack of transportation and communication forced the merchant, on his annual visit to

market, to buy largely. But all this exists now in memory only. The ubiquitous traveling man with his winning smile is always with us and if the want book fails to chronicle our needs his ever ready eagle eye for depleted stocks is ever ready to assist us. Six to ten days from New York, St. Louis or Louisville, not to mention our own local jobbers, makes it easy to get goods quickly. There is no excuse for a merchant not keeping his stock up these days unless he belongs to the brotherhood of ease taker. It is granted, then, that there is no necessity for heavy buying.

Quantity Price Not an Advantage.

The next feature, then, is the quantity price advantage? I assume that it is not. In these days of extreme narrow quantity differentials the magnitude of the purchase required is not offset by the difference in price, and only in the case of the semi-jobber, and with him only on certain staple lines is it justifiable. By this term—semi-jobber—I mean those of us who cover the small general stores in our territory.

It Is Much Better for the Retail Man

to buy \$50 worth of goods of a certain line at a 5 or 10 per cent. advance and sell \$45 worth, than to buy \$100 worth, sell \$60 worth and carry over \$40 in stock. This, too, is making a liberal allowance for his increase of sales by reason of lower prices and extra sales effort. Where does this merchant find himself next season? Betwixt and between—too much and too little which will result either in his losing sales by not buying at all, and selling out before the end of the season, or buying again and remaining overstocked. In either event he will be compelled to have recourse to his jobber with his nearby stock at a possibly higher price.

There is another feature, too, that figures largely in this overstock, loss of enthusiasm, disposition to cut prices and inclination to overstock. These are influences not to be despised, for much of success in salesmanship is due to enthusiastic energy.

Jobbers' Liberality.

It has been my experience that jobbers are very liberal in the matter of divisions and when approached right will make concessions or differentials that are very favorable to the merchant. He will also arrange special terms very often to the great accommodation of the retailer. Therefore, I assume that with buying in smaller quantities and often a given capital can be manipulated to much better advantage without embarrassment or inconvenience.

Benjamin S. Alder Company.

THE Benjamin S. Alder Company, 37 Warren street, New York, selling agent in New York territory and for export of a number of prominent manufacturers, is sending out new catalogues of the Wrightsville Hardware Company, Wrightsville, Pa., and the Grey Iron Casting Company, Mt. Joy, Pa. The former catalogue refers to Coffee Mills and an extensive line of cast iron Hardware and tools; the latter also refers to tools, cast iron novelties, &c., and House Furnishing specialties. Both books are accompanied by new price-lists.

WILLIAM A. ROGERS, LTD., manufacturer of Silverware and Cutlery, will discontinue its factories at Philadelphia and Oneida, and will materially enlarge its plant at Niagara Falls, N. Y. expending something like \$75,000 in additions and improvements. As a result it is expected to increase the working force of the company in the neighborhood of from 150 to 200 hands. The new buildings will be of brick and stone construction and will add about 65,000 sq. ft. to the floor space of the present plant. The other plants of the company at Northampton, Mass., and Norfolk, Va., will be continued as heretofore.

THE SIMONDS FILE COMPANY, Fitchburg, Mass., is distributing gratis an illustrated easel back display card, showing some uses for Simonds Concaved Screw Slotter Blades, across which diagonally is fastened a paper carton made to contain a set of four blades.

THE CHAMPION RIVET COMPANY, Cleveland, Ohio, has appointed as its general New England agent James J. Sullivan, 72 Mason Building, Boston, Mass., who for a number of years has represented George O. Wales & Co., Boston.

THE BOHART HARDWARE COMPANY has purchased the Shelf and Heavy Hardware, Stove, House Furnishing, Implement, Paint and Sporting Goods business of W. T. Farrar & Co., Bentonville, Ark.

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The Merchant's Best Friend.

The Mission of the Jobber's Traveling Salesman—His Value as Instructor, Demonstrator and Adviser—With the Merchant's Co-operation Substantial Results May Be Effected.

EXTRACTS FROM AN ADDRESS BY W. D. SIMMONS, PRESIDENT OF SIMMONS HARDWARE COMPANY, ST. LOUIS, AT THE ANNUAL MEETING OF THE MISSISSIPPI RETAIL HARDWARE ASSOCIATION.

You will remember Thomas Jefferson said: "You don't have to retrograde to become a back number; the march of progress goes merrily on. All you have to do is to stand still and see the procession go by."

Business methods have developed marvelously in the last quarter of a century. The old ways that prevailed "before the war" are obsolete and almost forgotten. New ideas and new methods have come to stay. "Goods well bought are half sold"—an axiom of the last generation—is hardly worthy of remembrance, except as a souvenir of bygone days. Competition in business is painfully acute, and every merchant must be up and doing, keeping abreast of the times, or he will surely be left by the wayside.

Is it not well for each of us to inquire of ourselves—and inquire searchingly—if we are keeping up with the procession and with the advancement that is going on all around us? Are we as Hardware merchants grasping new ideas and adopting up to date methods, or are we leaving that to the department stores and the catalogue houses? Are we letting them take the lead in such things and carry the crowd and the trade with them, while we sit in the back of the store and wonder why business is dull and unsatisfactory?

The other day we received a letter that pleased me as much as any letter we have received for a long time, because a gentleman who has been doing business with us for a great many years and who was writing to express appreciation of something we had endeavored to do to contribute to his success, used this expression: "I am glad it is my good fortune to have my account with a company who believe that the best way to help their

friends is to help them to help themselves." This letter pleases me, not that we are the only ones who are trying to help our friends and our patrons to help themselves—because every first-class jobber is doing that—but because it showed our efforts in that respect were appreciated, and we all like to be appreciated, and this gentleman not only expressed himself as being appreciative, but gave us a most substantial evidence of true appreciation in the earnestness with which he took hold of what we had to give him in the way of suggestions and methods, and by the intelligent and industrious manner in which he carried out those suggestions successfully to his own credit and profit directly and to ours indirectly.

You have perhaps often heard the expression originated by the founder of our company: "The first duty of the Hardware jobber is to help his customers to prosper." That has become an axiom in the Hardware business—one which is accepted to-day by practically everybody engaged in it, and still you don't have to go back many years to find the time when the man who worked on that principle was the exception rather than the rule. To-day everybody talks and at least makes a show of working on that principle, and I believe the majority are conscientiously endeavoring to carry it out and make their transactions strictly in accord with the spirit of it.

Jobbers' Interest.

What is the motive power back of this effort? Why do the jobbers of to-day plan and coach their salesman along those lines? Why do they employ in such work the best talent they can command and give the time and attention of the principal officers of their organization to devising ways and means of helping the retail merchant to make his business more successful? Is it philanthropy? Not at all. It is comradeship.

It is positive, practical evidence of recognition on the part of the jobber that his interests and the interests of the retail merchant are so closely allied that what injures one injures the other; what helps one helps the other; and what inures to the success of one directly does so equally, although indirectly, to the success of the other.

It is the clearest kind of evidence that the jobber recognizes that he and the retail dealer are traveling along together, bound for the same destination—evidence that he recognizes that a thing of that kind cannot be only talk, pretense and show, cannot be anything in the nature of "blarney" or buncombe—that it must be the genuine article, not only a thing of words, but backed up by results and con-

stantly repeated acts to evidence its sincerity and entire absence of anything akin to the "green goods" or "gold brick" business.

Of course there are exceptions to this rule, and the retail dealer has before him the problem of distinguishing between the man who actually means to do business with him on this comradeship basis and the one who means only to use smooth talk to that effect as an empty substitute—who has in his mind the idea that, while he intends to give the appearance of traveling along and sharing whatever comes with the merchant, he really thinks their progress lies in opposite directions.

Like all other good things, this spirit of commercial comradeship is sometimes counterfeited and abused, but that very fact makes it of all the more value to the discerning merchant—the man who looks beneath appearances—who learns to distinguish between the genuine and the imitation. I remember a merchant from the

Far West once said to me, in speaking on this subject: "I generally start out with a fellow on the basis that he is working with me on the square, and give him a chance to take advantage of me. The first time he does it is his fault; if he does it again it is my fault. I guess I am a good deal like the Indian out our way, who works on the same plan but puts it a little differently. He says: 'Whi'e man fool Injun; first time, shame on white man; second time, shame on Injun.'"

Sentiment in Business.

We hear often the statement that there is no sentiment in business, but we see more often the sentiment of friendship absolutely controlling business transactions, only too often to the material detriment of the one whose act is born of his friendship for the other.

One of my early recollections is of an instance where I was in a man's store selling him a bill of goods, and his clerk was out in front showing a gentleman a Heating Stove. Finally the customer came back and asked the proprietor the price he would make to him on that Stove. He named him a price, and the customer said: "Why, that's the regular price, isn't it? I thought you would give me a better price because of my being a good friend of yours."

The merchant replied very nicely and tactfully, "Doesn't that seem to you to be a good price? I think that is the best Stove for the money that has ever been put on the market." "Yes," the fellow said. "That may be so, but I thought you would make a better price to me on account of our friendship."

"Well," replied the merchant, "let us look at that another way: Suppose John Smith across the way, who has only come here to go into business a few months ago and whom you never knew before, had that Stove and I did not keep Stoves and you could buy this one of him at that price, would you think it a good purchase—would you not pay him that price and be entirely satisfied to do so?"

"Yes," said the fellow, "I guess I would." "Well," said the merchant, "don't you think, in view of our old friendship, that you ought to be willing to do as much for me as you would for a stranger? It seems to me you ought, unless you want to make our old friendship a penalty rather than a benefit. If I cannot make money off of my friends, I cannot make any at all, because my enemies won't buy from me."

"Well," said the prospective Stove buyer, "that is a different way of looking at it, and I don't know but what it is right."

"I am glad to have you think so," said the merchant. "If it isn't right, I had better go out of business or go somewhere where I am not known. But let us take your own case. You are in the insurance business; I have always given you my insurance without any question; when I want to buy insurance, I come to you and you place it with your company and I pay the regular rate and never question it—I never go near anybody else—I give it to you at the same price, because of our friendship. Suppose I should come to you and say, 'Bill, I want to place some insurance on my stock, but unless you cut the rate and give me a lower rate than this fellow across the street, who isn't a friend of mine, I will give him the business,' what kind of friendship would you call that?"

The insurance man said: "You are right; any man who isn't willing to have friends on a 'give and take' basis, but who wants it all 'take' and no 'give,' is no friend at all. Send me the Stove, and you will never hear of me asking anybody to go down in his pocket for the privilege of classing me as one of his friends. I never looked at that thing just right, but I have it straightened out now, and I am glad I came in."

As he went out the merchant remarked to me that was the best and most satisfactory and most profitable line of Stoves he had ever handled and he had made up his mind to push that line exclusively during the coming winter, be-

cause he had figured out he could make more money that way.

That was shortly before luncheon. After luncheon, when we had resumed our work of making up his order, another gentleman came in—another old friend of his—but this time a salesman, who had another line of Stoves, which this man had tried and made up his mind was less satisfactory and less profitable for him to handle and hence he would buy no more of them. His old friend, much disappointed at his decision, finally put up a plea for the order on the basis of old friendship. I will not take your time to go into the detail of his argument—most of you have had that kind of pressure brought upon you too often and you know it only too well—but finally the merchant was prevailed upon to place a small so-called complimentary order with his old friend for something he did not want—something he could not afford to buy, simply because he could make better use of his capital and his time with another line.

Another Case of Pressure.

These two occurrences coming so close together made a great impression on my mind, because they illustrated very clearly how at least some people who talk most about friendship in business want that friendship to operate only from others to them, but never seem to be impressed with the idea that their friendship should lead them to consider the interests of their friends at least to such an extent as never to ask or expect them to do something that amounts to paying a tribute for the privilege of that friendship.

The Jobber's First Duty.

Now, as to this idea—"The jobber's first duty is to help his customers to prosper"—is it simply a well-sounding, empty phrase, or does it really mean what it says? If it does, how is the jobber of to-day trying to help his customers to prosper? Well, I will tell you. He is employing as salesmen men capable of conveying to you his suggestions and messages in a practicable way, demonstrating them for the benefit of you, his friends. He is employing men who can and will put at the command of his customers the new ideas and better ways of conducting business which he, through his many representatives, gathers from his daily contact with merchants in all parts of the country. He is employing men who will take an interest in helping you to teach your clerks that what is more needed to-day than anything else is better store salesmanship—helping you to make them better salesmen—to learn how to arrange and display goods attractively—how to dress windows—how to meet customers at or near the front door and give them the "glad hand" of welcome as they enter.

Salesmen as Instructors.

The jobber is teaching his representatives that it is to his interests as well as to the interests of his customers that they should do all of these things and many others too numerous to mention, that they should not only consider it their duty, but should become so interested in it as to make it their great pleasure, because no man does anything as well as that which he enjoys doing.

The jobber is using his position of advantage and his widespread opportunity for studying conditions to keep a sharp lookout for the signs of the times and to give his customers promptly the benefit of that study and watchfulness—to observe carefully any developments that are likely to jeopardize the interests of his patrons or become serious handicaps or competition to their business, and no sooner does he see anything of this kind in the horizon than he begins at once to devise ways and means of co-operating with his friends and of helping them to win out in the fight which he sees developing.

When, for instance, the catalogue house first began to show signs of developing in the direction that would be a menace to a continuance of the mercantile system of this country along the lines which had been so largely responsible for its rapid growth, a jobber was the first one to recognize that danger—the first one to sound a note of alarm—the first one to devise and put into the hands of the merchants means of fighting this common enemy. So he set to work to develop and put upon the market lines of goods of greater desirability than any that can be obtained by the catalogue houses, and then, through advertising in newspapers and national magazines, to create a demand for them, to educate the ideas of the people up to this—a class of goods that cannot be bought from the catalogue houses.

He practically brings the buyer into your store, ready to pay you a fair price for a first-class article which will give him satisfaction, make him feel kindly to you, bring him back when he wants something else good, and, best and most important, at a very satisfactory profit to the dealer.

And so I might go on for an hour telling the many ways in which the jobber is trying to help his customers to prosper—designs and materials for window displays, store signs, price tags, advertising matter and cuts for wrapping paper or local newspaper work—and so on through an almost endless list of devices, all of which have their one general object, their joint success and prosperity.

Therefore, I say, without fear of contravention or even question in this company, that the merchant's best friend is a good salesman. He is not only the representative and demonstration agent of the jobber whose interests are so closely allied with those of the retail merchant, but he is directly and personally a partner in the business of his customers from all practical standpoints, in that he shares directly and individually in their successes and in their losses.

The Merchant's Best Friend.

He must not only be well versed in this most complicated business with its mass of details, but he must be, to an extent, a traveling encyclopedia on many subjects of interest and of value to his friends and patrons. He must be constantly alert to pick up and to give to his customers new and up-to-date methods as they develop, not only knowing what is done that is new and effective, but just how it is done, in order that in the event his customer takes kindly to the proposition and wishes to give it a trial, he may co-operate with him by teaching his clerk his part of the programme. A good salesman becomes a clearing house of suggestions and ideas which he carries from place to place to the benefit of all, because a new idea which works out successfully in one town generally has in it equal possibilities in another without any injury whatever to the originator. On the contrary, its success only makes the originator more alive and ready to take up other new things which may be brought in exchange for this which he has sent down the line to others, whom he perhaps may not know personally but of whom he has heard and whom he has, by his suggestion, benefitted.

Of late it has been the part and practically the duty of a good salesman to encourage his customers to keep more goods for the ladies and display them in such a manner as to bring the ladies into their stores, that the Hardware store may not be a store for men only, which, unconsciously, too many merchants make it, forgetting that most of the money is spent by the ladies.

Circulating Ideas and Suggestions.

When a naturally keen observation, made more keen by experience and constant study, leads him to recognize wherein one of his friends is not getting results that he would like to or should have got, he sets about to study the situation, to diagnose the case, as the doctors do, and then, with rare tact and diplomacy, to suggest to his friend ways and means of getting rid of the trouble, using as examples the plans adopted by other merchants sufficiently far away to be in no sense competitors. While keen to get as large a share of any man's business as he can influence, he is just as ready to say, "I recommend that you don't buy that," or "that you cut that quantity in half until my next trip," as he is to urge an increased purchase.

In short, he demonstrates that it is entirely practical for a man to properly and successfully represent a distributor, while at the same time always conserving the best interests of his patrons—that it is entirely practical for a traveling salesman to serve both equally well—not to serve two masters, but to serve one interest, because their interests are one and the same.

The efforts of the jobber to equip his salesmen with knowledge, ideas and materials with which to help their customers to prosper avail nothing if the retailer will not meet them half-way and try to adopt, and at least give a fair trial to their suggestions, many of which are of a kind that do not cost a dollar of extra expense to put into execution, so that the chance is all on the side of profit at the expenditure of a little extra effort getting out of the old rut. Allow me to submit for your consideration this thought: Have you recognized the good salesmen who visit you as being demonstration agents, who can and will help you to raise perhaps two dollars where you have been raising one? Have you shown an interest in what they had to say along these lines? Have you, by your interest and readiness to give a fair trial to their suggestions, encouraged them to bring to you whatever they have that is good that you may get full benefit from it? Great is the power of encouragement. Have you used that power in such a way as to get out of this phase of modern business all there is in it for you?

Getting Out of Trouble.

Power of Encouragement.

As manufacturers and distributors, our house depends

The Retailer's Part.

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Retailer Must Come Half Way.

Power of Encouragement.

As manufacturers and distributors, our house depends

The Hardware merchant's investment consists of merchandise divided into many different lines, such as Wire, Nails and other staples as one division; Shelf and Builders' Hardware as another; Tinware, &c., and what might be generally classed as Kitchen Goods;

Making Each Line Produce Income.

Cutlery, including Scissors and Shears; Sporting Goods, and so on through the list. These are the acres of the Hardware merchant. From each of these acres it is possible to produce a certain income. The amount you get from each one depends on the way you work it.

As manufacturers and distributors, our house depends

upon its sales to retail Hardware merchants. We have very many esteemed friends among the Hardware merchants of Mississippi, and I have come here to learn whether there is any way in which we can serve you better and more to your satisfaction.

It is our desire to give you, through our representatives, whatever will help you to keep abreast of the times—whatever will put you in position to meet the constantly arising new kinds of competition which are developing all along with the other developments of our country, and in addition to coming to pay our respects we are here to learn how we can serve you more acceptably and more helpfully.

The Redemption of Smithson.

A Memorial Day Incident at Oretion.

BY FAR WEST.

THE Oretion Hardware Company was holding its regular monthly meeting, during which ways and means were being discussed for the improvement of the business. As these meetings were held at the office in the evenings, more liberty was allowed than during business hours; chairs were tilted back, while a blue haze of tobacco smoke curled toward the ceiling. The bookkeeper had presented his report. Financial affairs had been discussed with the usual bickering about collections, when, following the regular order of business, the president brought up the subject of store management.

"It has come to the place where something will have to be done with Smithson," he began. "We have been patient and forbearing with him, but this Rifle business is the limit, and I am for giving him his walking papers."

A Loaded Gun and Its Consequences.

"What is the truth about that accident?" inquired one of the directors. "There has been a good bit of talk about it on the street, but I'd like to know the straight of it."

"Why, Smithson had charge of the case for rented Guns. Ike Spanner wanted to rent a Rifle. Well, somehow between them the Gun went off. Smithson says Ike had it and Ike says Smithson had it. Anyway, the Gun was loaded and the ball went through the plate glass show window and into Doc Bird's office in the second story of the Millar Block, just as Doc was in the act of pulling a tooth. It was extracted without pain, but you know what the glass cost us! It was rank carelessness on Smithson's part to allow a loaded Gun to be placed in the case."

"Then there is Ben's mashed finger," put in the bookkeeper, who evidently had no love for Smithson.

"How about that?" questioned the same curious director.

"The boys were putting together that patent road machine, when Smithson pulled the wrong lever, putting Ben out of commission."

Pulled the Wrong Lever. "His mind is evidently not on his business. I guess he'll have to go," assented the director.

The secretary, who had been watching the faces of the various members present, at this point said: "I believe there is good stuff in Smithson, but we go at him the wrong way. I have been watching him, and the plan I would recommend is that we raise his wages."

This proposal was met with such a laugh of derision that the secretary exclaimed, "Hold on now! I'll tell you what I'll do." Hastily writing a check he handed it to the bookkeeper. "Here is \$50 I'll put up for the redemption of Smithson. Just let me take him in hand. If I make a man out of him the company is to the good and I get my money back. If I don't make a man of him the \$50 will be my loss and not the company's." With mock expression of sympathy his offer was accepted, and the management of the incorrigible Smithson was handed over to the secretary.

The next day, as Smithson was making dilatory progress resorting Bolts, the secretary came up to him, "How is your mother getting along, Jim?" he inquired, sympathetically. Smithson looked up quickly, puzzled and surprised at the interest shown in a sorrow he thought

was unknown to any but himself. Directing the conversation back to the subject in mind, the secretary continued, "Jim, we are short-handed now with Ben crippled, and there is no one to trim our window for the Mon-go-pol contest. Now how would you like to try for the prize?" Jim flushed guiltily at the mention of Ben's mishap, but the proposition of the secretary filled him with pleasure to the exclusion of other emotions. Accustomed to being ordered around, he had fallen into the pernicious habit of waiting to be told before doing anything. The opportunity for expressing his individuality was accepted with an enthusiasm that argued well for the outcome. Some weeks later, when the secretary handed Jim the amount of the third prize, won in the Mon-go-pol contest, it was difficult to determine which was the most pleased. But, when in addition, the secretary told Jim that his quarterly salary would be increased \$50 Jim could hardly stammer his thanks.

The Secretary Gets Busy.

Jim Gets a Prize and Salary Increase.

"So far so good," remarked the secretary, "but now we have a more difficult task before us—the parade on Decoration Day. It is going to be a great affair, as every store in town is going into it strong, and it puzzles me to know what kind of a float to have that will be a taking novelty. There will be airships and war boats to burn, so if we could only devise something novel but appropriate to the day it will be a great ad. for the company. What do you think we can do?" Appreciation is a stimulus to endeavor. After this conversation the secretary and Smithson were frequently noticed with their heads together. A shed, used as a powder magazine until the authorities required its abandonment for that purpose, was cleaned out. A lock was put on for which only the secretary and Smithson held the keys. Far into the night a light was noticed burning in the shed, but in spite of questions what transpired behind that lock remained a mystery until the 30th day of May.

The Decoration Day Parade.

In the meanwhile scouts had been sent out to discover what the other stores were going to have. Word came back that there would be ranges in operation baking bread, war ships with guns that shot tin cups into the crowd, airships that would put the Wright aeroplane in the kindergarten class, and other wonders that filled the air with expectancy. All the while it was remarked that the secretary had an unusual amount of business to attend to in the surrounding country.

Devices of Other Stores.

The eventful day opened clear, but cold. Every hitching post in town was utilized long before 9 o'clock; the farmers' daughters, shivering in their white dresses, waiting for the parade. After the delays usual on such occasions, the music of the band caused a rush to the curb. The parade was coming! It was soon demonstrated that Oretion had risen to the occasion. The applause that greeted the efforts of the merchants grew into a roar as the float of the Oretion Hardware Company approached. Sixteen yoke of oxen drew the float, each covered with a white cloth fly net, on which in large black letters was the name of the firm. The float bore no advertising whatever. The center was raised higher than the sides, representing in dull grays a tomb. Gradually the tomb opened, disclosing leaves brightly colored, forming a large rose, from the center of which slowly ascended a beautiful girl representing Immortality. Around her was draped the American flag, while held aloft in her right hand was the wreath of Memory.

The Day and the Float.

At the meeting of the members of the Oretion Hardware Company held shortly after Memorial Day the \$50 of the secretary was returned to him, the president remarking that in the management of clerks "it was more profitable to develop than to discharge."

The W. C. Vandewater Company, Princeton, N. J., has changed its corporate title to Farr Hardware Company. The officers and stockholders of the company continue as during the past year.

MAKING GOOD IN BUSINESS

HINTS AND SUGGESTIONS FROM MANY SOURCES

Do It! Do It!!

Do it! Keep on and leap on—get through it!
Don't stop in the road or hop like a toad
From this side to that, or fly like a bat
With your head upside down till your brains rattle 'round
Of course—there are boulders!
But you have strong shoulders—
A tug and a stride, though, will move them aside, so!
Deep ruts? To be sure.
Toward the end, though, they're fewer.
The path over there may appear far more fair.
But you haven't the time to find out if it's prime,
And the road to the right winds too far out of sight.
It may prove much slicker and smoother and quicker,
But you know your way's right, for the goal is in sight.
So what if it's rough—isn't sureness enough?
Jot this down where 'twill stay, for you need it all day.
What's got without effort is worth what it cost.
The easily gained things are easily lost.
When a road is worn flat you can bet your best hat
That it leads to a place where too many are at.
When a way is all roughness and gruffness and toughness,
And brambled and scrambled and wildly o'ergrown—
You can make up your mind
There are new things to find.
That you're getting at something that hasn't been known.
If you don't go on through it you'll live on to rue it.
Somebody who isn't a quitter will do it!
He'll laugh as he rambles his way through the brambles;
He'll know that the big things of life must be won.
He won't mind a stumble (it takes time to grumble);
He won't care a hang if he does bark his shin.
He won't be defeated because he's o'erheated,
He'll leap on and keep on until he gets in.—*Herbert Kaufman*

How to Become a Traveling Salesman.

A young man wrote to Comptroller Metz of New York City asking his advice as to how to become a traveling salesman, to which the Comptroller, who is an ex-commercial traveler, made the following characteristic reply:

Dear Sir: In reply to your favor, in which you ask me whether I have ever heard of the National Salesmen Training School, would say I never have. You also ask do I really think an inexperienced man would be qualified by a correspondence school to maintain a lucrative position as salesman?

In reply to the latter question, I believe a man can be educated to become a salesman after years of hard work and study; not the study of books on salesmanship or by correspondence schools, but from the study of the goods which he is selling and from studying men's natures and hobbies.

The making of a salesman begins with a young man entering a mercantile business. He must start at the bottom, for those who begin at the bottom and gradually work themselves up are the kind that count.

I would advise you to get a position where there is a chance for advancement should your efforts warrant it. If you want to become a salesman, I advise you to get into some manufacturing firm making good stuff—for quality is remembered long after prices are forgotten—and learn their line thoroughly. It is the man who knows his goods who can present them to the trade in the true light that convinces and gets the business.

Then get on the road. Even if you have to go along with an old traveler and pack his trunks for him so you can get a chance to buck up against the real thing—the retail trade. Experience teaches better than correspondence schools. If you learn the goods, the field and the customers you will se-

cure an asset which will make you valuable and independent, an asset which you can carry into the general market and easily find some one to pay you a good salary, for men who have money are always hunting for men who have knowledge and brains.

I had to start with nothing but a want-to-work. I followed the plan I am advising you to follow, and took my Post Graduate Course in the School of Hustle.

Wishing you success, I am,
Very truly yours,
H. A. METZ.

Doing More than You Can.

Necessity is the discoverer of hidden capacity, no less than the "mother of invention." A factory superintendent was telling me that he was turning out 800 dozens a month of an article with the same force and the same equipment that he used to turn out 300 dozens with.

"You must not have been working up to your full capacity before," I said.

"Evidently not," he said. "But we thought we were. I thought so and the men thought so, and the members of the firm thought so. If anybody had told me we were not doing our very best I should have been offended. But the business began to increase and the orders kept pouring in and we got behind and simply had to do more. With the work crowding in on us we simply had to organize the work some way to get it done. There was room to put on but a few more men—none to speak of. But we put more speed on the machines and laid out the work more systematically, so as to utilize any waste energy, and the first thing we knew we were actually producing more goods than we had thought it possible to make. It does seem now that we are running at the highest possible capacity. But I suppose if we had to do it we would find some way to increase our present output."—*W. P. Warren.*

Discriminating Appreciation.

The surest way to make agents do their work is to show them that their efforts are appreciated with nicety. For this purpose you should not only be careful in your promotions and rewards, but in your daily dealings with them you should beware of making slight or haphazard criticisms on any of their proceedings. Your praise should not only be right in the substance, but put upon the right foundation; it should point to their most strenuous and most judicious exertion.—*Arthur Helps.*

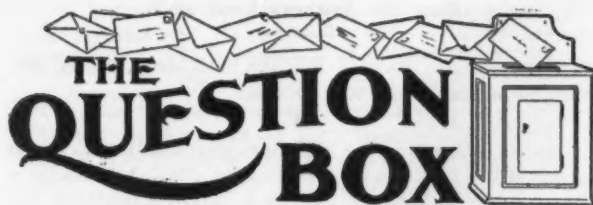
Abstract of Reasons.

It is a good practice to draw up, and put on record, an abstract of the reasons upon which you have come to a decision on any complicated subject; so that if it is referred to, there is but little labor in making yourself master of it again.—*Arthur Helps.*

GEORGE F. BAUER of the firm of Addikson & Bauer, Jackson, Miss., died in that city May 14, in his thirty-eighth year. He was one of Jackson's most prominent and influential citizens, having been vice-president of the Merchants' Bank & Trust Company, a director of the Mechanics' Bank, City Treasurer and a member of several benevolent organizations.

HENRY DISSTON & SONS, Philadelphia, Pa., are distributing a Sheet Metal Saw Sign for retail Hardware merchants' use. It is oblong, of irregular contour with rolled corners, and has a brass chain for hanging. It is finished in five colors and is lettered as follows: "We Sell Disston Saws."

THE SARANAC MACHINE COMPANY, St. Joseph, Mich., is sending out a thermometer as a reminder of its product, the Advance fruit package, basket, crate, butter dish, book stitching, corrugated joint fastener and special stapling machinery.



THE QUESTION BOX

This department is open for the discussion of questions which arise in the practical conduct of the Hardware business. Our readers are invited to contribute, submitting inquiries or answering questions.

Correspondents are expected to give their names and addresses, but in order to encourage frank expressions of opinion the advice of our correspondents will be treated in confidence, names and addresses not being published.

For convenience Questions or Answers should be addressed to THE IRON AGE QUESTION BOX, 14-16 PARK PLACE, NEW YORK.

Changes and Failures in the Hardware Business.

Why are there so many changes and failures in the Hardware business in the West?

This question, received from a correspondent in one of the Western States, has drawn out a number of replies, some of which are set forth below. It will be observed that several of the writers report only a normal condition in this respect. Others agree with our correspondent's view and mention some of the contributing causes.

FROM COLORADO: We are quite surprised at your correspondent's inquiry. From our own knowledge of what transpires in the territory in which our jobbing business is transacted, namely, Colorado, Wyoming, Utah, Idaho and New Mexico, we note very few changes in the firms on our list of customers. With one or two exceptions, we have not found any failures. Now and then changes and failures are to be expected in a new section of the country like ours. We really cannot ascribe a good reason for your inquirer's pessimistic mood, and the writer is not by any means a "thoughtless optimist."

FROM WASHINGTON: Our answer is lack of association effort and lack of knowledge of the cost of goods—that is, the expense of doing business. The writer recently talked with a merchant who claimed to be doing business at an expense of 10 per cent. of his gross sales. We took figures from his own books and proved to him from such figures that it was costing him 17 per cent. of his gross sales to do business. He had omitted from his expense of doing business such items as loss on bad accounts, donations to charity, interest on investment, drayage and several other similar items.

FROM KANSAS: I do not know of anything of this sort in this section of the country. If there is much basis for your correspondent's view it is probably the effect of the competition of catalogue houses which sometimes perhaps drives out the small merchants in the towns and villages.

FROM TEXAS: In the section where we do business there are very few failures and very few changes in business. We are situated in southwest Texas, and our trade lies in this section and in Mexico. Known failures in Mexico are very limited, probably on account of the strict laws in that country.

FROM MISSOURI: As to changes and failures in the Hardware business, will say that there is no such a thing in our city or neighborhood. I do not recall more than two failures within the last 10 years.

FROM OKLAHOMA: There are several reasons for this condition of affairs in the West, and, no doubt, the same

reasons would apply to other sections of the country. The first and principal reason for so many changes and failures in the Hardware business is the lack of capital. Too many men, especially in our section, undertake to

Lack of Capital.

run a large business on a small capital. Some men have succeeded well in their business, even though they had very little capital to start with. What was lacking in capital was made up for in push and good business judgment, but in a great many instances they have been compelled to sell out to save themselves or have failed in business. The second reason which I will name is the lack of a working knowledge of the business. Many farmers and others

Working Knowledge.

who imagine that the Hardware business is just about all profit launch out in this business because they feel that they can come nearer making a success at this than they can at some other line of merchandise. They think they know more about this line of business, especially the Implement line, than they do of other lines, and, therefore, more of them enter this kind of business. Their lack of experience, lack of knowledge as to costs, lack of ability to buy right and lack of selling ability to sell what has been bought soon places them out upon the breakers, and they must either go down or have some one come to their rescue by buying them out. A third

Dissipation and Gambling.

reason is that of dissipation among some of the dealers. Here and there we find a man in this business who looks too much upon the cup when it is red, and, coupling the vice of gambling with that of the drink habit, he soon goes down.

A Traveling Salesman's View.

The following interesting letter is based on the experience of a Nebraska traveling salesman:

The Hardware situation at the present time is laughable and at the same time deplorable on account of the number of parties buying into a business that they don't understand. The writer has had 25 years' experience, 10 years of that time in a \$100,000 stock doing a business of \$1000 per day retail and the balance of the time on the road. My observation is that 85 per cent.

Rudimentary Ignorance.

of the parties engaged in the Hardware business don't know the first rudiments of the business. Neither do they know how to carry a well assorted stock of anything, nor how to sell and explain what they have got. They can tell the jobber and the manufacturer how they ought to run their business, but when it comes to running a little stock of Hardware, amounting to \$5000 or \$8000, they are not in it, only to find fault because they cannot sell the goods and spend their time with the Hardware store loafer that sits around, driving away what little trade he might get. Therefore they ought to go back to the

Back to the Farm.

farm, where they came from, and not tackle something for which they are entirely unfitted. Fifteen per cent. of the Hardware dealers are up to snuff—fine assorted stocks, doing business all the time, too busy with customers to talk about catalogue houses and to tell the manufacturers and jobbers how to run their business.

Local Check or Bank Draft?

Should remittances be made by local check or bank draft?

The manner in which this question is regarded by both retailers and jobbers is reflected in the letters below. It will be observed that jobbers generally prefer remittance by bank draft, while the retail merchants are inclined to favor the local check on account of its convenience.

Expressions from Retail Merchants.

FROM ARIZONA: Our experience has been that the majority of Hardware dealers cover their accounts by local checks.

FROM NEW JERSEY: Remittance should be made by check; never by accepted drafts. All checks should positively be indorsed in writing and not by a rubber stamp. Banks should refuse rubber stamp indorsements.

FROM ILLINOIS: Bank draft by all means, unless checks are payable in Chicago or New York.

FROM MAINE: We believe the local check system is by far the most convenient and logical way to remit. Every firm is compelled to use a checkbook. Nearly all local and private bills are paid by check. Many large firms buy a large book containing 1000 or more blank checks. To remit by bank draft would take a great deal of a bookkeeper's or cashier's valuable time running to the bank for bank drafts. Many times he would be compelled to await the bank's convenience to give him the draft. We find it so in getting a cashier's check. They have many people to serve. Bank drafts are an inconvenience and a nuisance.

FROM COLORADO: Our idea in regard to making remittances is that a dealer should pay par wherever he buys the goods. Therefore, if he is in a town that the banks require exchange he should add it or send his remittances with exchange. If that comes too high get a draft from his bank or a money order or send it by express. Of course this is always a whole lot of bother. For that reason we carry an account in Chicago, and pay all of our Eastern bills with checks on Chicago that are par anywhere. All remittances that we have to make in the State of Colorado will clear without exchange on our local bank, and of course we use checks on our local banks everywhere where they clear without exchange.

FROM INDIANA: Ever since we have been in business, some 20 years, we have done our remitting by firm check. We do not remember more than one instance of having sent New York exchange. We did our remitting in this manner from the start on account of the nuisance of having the bank furnish us New York drafts every day, and as we have had very few complaints we have continued to do this up to the present time. Latterly we have insisted upon this method for the reason that comparatively few jobbers or manufacturers from whom we buy send us any receipts, and our own check being returned to us acts as a receipt. If we were obliged to send New York exchange this would not be the case.

FROM DELAWARE: I think the local check is preferable, as a draft oftentimes would turn up at an inconvenient time, and besides the impression is made at local bank that the party has to be goaded into paying his bills. So far as I am concerned, in dealing with houses at a distance, say in Ohio, Michigan or Illinois, I prefer them to draft for account, but I withdraw my trade from a nearby house that collects by draft. Most of our business is done on the cash basis, that is, we take the 10-day cash discount, but sometimes a bill will get past us, and of course if we have missed the 10 days we then avail ourselves of the credit term. At any rate, I think a dealer should have 10 or more days' notice of proposed draft, so that he can settle by check if he so desires.

FROM A HARDWARE INSURANCE COMPANY SECRETARY: This question has come up from time to time, and the jobbers have insisted that remittances be made by New York draft, claiming that they should be exempt from paying exchange on local checks. I never had an opportunity of investigating this until I became secretary of our insurance company, and since that time I have cashed local checks in the amount of approximately \$100,000 and have paid the total of 40 cents for exchange. Hence, it would seem to me that the objection raised by jobbers on this particular are *nil*. The personal check in the payment of an invoice is a valuable record for a retail merchant to have, and they should be allowed to make payments in this way if they choose to do so.

How the Jobbers Look at It.

FROM PENNSYLVANIA: We like bank draft where possible, otherwise take local checks.

FROM ILLINOIS: We sell our merchandise as from — and the bills are payable in that city. A check on a bank in Idaho does not pay us a hundred cents on the dollar of our customer's indebtedness.

FROM NEW ENGLAND: Our business is largely confined to New England, and it would be difficult for many of our customers in small towns to obtain bank drafts. Boston banks accept local checks from our customers without expense to us except in a few instances, when they charge one-tenth of 1 per cent.

FROM OHIO: Retail merchants should make their remittances by bank draft if possible for them to do so. Nevertheless, we are always inclined to treat our customers liberally, and if it inconveniences them to pay in bank draft we accept their local checks at face value.

FROM INDIANA: It would of course be very much more satisfactory if retail merchants would settle by bank draft instead of local check, but so far all efforts of individual houses to bring this about have been unavailing, as competitors are perfectly willing to accept local checks. We would be glad, of course, to have our customers send us drafts, but with collections as they have been the past few months we are very glad to get local checks.

FROM NEW YORK STATE: As to whether remittances by retail merchants should be made by local check or draft would say by all means local check. We find a number of New York houses stamp their invoices with request that debtor remit with New York exchange. We have, in fact, had checks returned to us requesting that this be observed, but as — collections are at par in New York, we have returned them with this notation. The writer does not know what arrangement

Believes in Local Check.

depositors have with New York banks, and it may be they are charged with exchange on country items, but it would seem to me if the depositor kept a good account such items should be taken by the bank at par, as the rate of exchange between banks is very small. Our checks come from all over New York, Vermont and Massachusetts, and our bank makes no charge for collection, so we are indifferent as to whether customers remit by

Getting Drafts Sometimes Difficult.

check or draft. A number of our customers are in very small towns where there are no banks, and it would be a pretty difficult matter for them to obtain draft from their bank and remit in time to take advantage of the cash discount. They could, of course, get a post office order, but that would cost them exchange. I think it is a good policy to let good enough alone, for, if people had to get draft to pay each bill it would probably result in their deferring payment until they had other bills due, so as to make but one payment a month, or longer, perhaps.

FROM ILLINOIS: The question of whether a merchant should remit by local check or bank draft has been discussed at considerable length, and a solution of the problem does not seem to have been arrived at. We find that certain of our customers invariably remit in bank drafts, while others always send a check on some local bank. We know that it is a source of much convenience to some merchants to make their remittances with their own checks. All of them do not have good banking facilities in the town. Even when they do many merchants are busy with customers during the day, and, therefore, attend to the matter of making their remittances, writing orders, letters, &c., in the evening. The — banks have such a very large list of correspondents that it enables them to cash at par most of the

Poor Banking Facilities.

Local Jobbers' Advantage.

items coming from this section, and many of the banks in the smaller cities and towns around here carry accounts with some one of our local banks, all of which enables us to accommodate many of our customers by accepting local checks at par without much inconvenience or loss to ourselves. In this as in many other respects, the local jobber is in better position to adjust himself to the requirements and convenience of the merchants in his territory than the larger jobbers who try to do the business at long range.

Requests for Catalogues, Etc.

The trade is given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS for catalogues, price-lists, quotations, &c., have been received from the following houses, with whom manufacturers may desire to communicate.

FROM H. H. PETERSON, Loomis, Neb., who has bought the Hardware business of W. E. Gamel.

FROM WILSON HARDWARE COMPANY, Denton, Texas, which has been incorporated with a capital of \$40,000 to conduct a Hardware, Stove, Implement, Sporting Goods, Plumbing, Vehicle and Harness business. A 60 x 100 ft., two-story, block is being remodeled for the use of the company and will be occupied after June 1. The company will also have three warehouses.

Kerosene and Ramie Mantles.

Since the introduction of ramie fiber into the manufacture of gas mantles this industry has been given a marked impetus. The ramie fiber used as a basic fabric of incandescent gas mantles imparts to the manufactured article a greatly increased candlepower, durability and strength and makes them nonshrinkable, a qualification lacking when cotton is used. The Perfected Mantle Company, 18 Warren street, New York, and Springfield, Mass., is placing on the market a complete line of ramie and cotton mantles. This company claims to be the first American plant to engage in the manufacture of a kerosene mantle adaptable for kerosene lamps. The sale of kerosene mantles is rapidly increasing in country districts where they are largely used for illuminating purposes. From tests made with the Monad ramie arc mantle of this company, a uniform degree of light has been obtained approximating, it is asserted, 105 candlepower. This high degree of luminosity is attributed to the ramie contained in the mantle which, it is said, is impossible under the old methods of manufacture. A novelty put on the market by the company is its Self-Lyte mantle, which possesses the property of igniting the gas spontaneously, without using matches, the result of much experimentation to perfect the invention. The Self-Lyte mantle contains two chemical pills of a secret formula and is attracting attention in lighting circles. The tendency of the gas mantle trade for some time has progressed toward a more expensive class of goods, as durability is of great importance in gas mantles. The use of incandescent ramie mantles of both upright and inverted styles is increasing in store illumination, and various improvements are contemplated for introduction during the coming fall season. The Perfected Mantle Company manufactures every style and form of incandescent mantles, and is said to be the only house engaged exclusively in the production of this class of goods in the United States.

The Gem Stair Carpet Fastener.

The accompanying illustrations show the new Gem stair carpet fastener, manufactured by the Pressed Steel Mfg. Company, 454 Bourse Building, Philadelphia, Pa. The fastener is very simple in design and can be adjusted to any high step, lugs on the upper section fitting into slots, a number of which are provided $\frac{1}{4}$ in. apart in the lower section. No screws or springs are used with the device and no tools are required to place it in position. It is made of heavy steel, embossed, heavily

bronzed. In application the fastener is adjusted so as to be about $\frac{1}{4}$ in. longer than the space placed in. The fastener is then broken, as shown in Fig. 1, the points at each end being placed close into the corner of the step

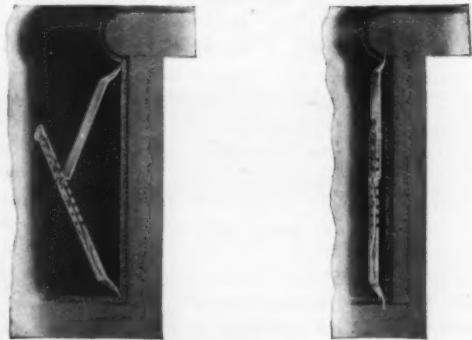


Fig. 1.—The Gem Stair Carpet Fastener.

and pressure applied against the fastener until it comes up straight, forcing the points into the woodwork, in

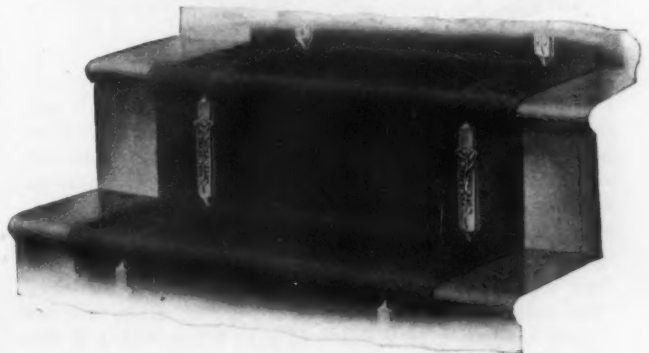


Fig. 2.—Gem Stair Carpet Fastener in Place.

which position the carpet is firmly held, Fig. 2, making in addition a handsome finish.

The Diamond Edge Roller Guard Safety Razor.

The Norvell-Shapleigh Hardware Company, St. Louis, Mo., is placing on the market the safety razor shown herewith. It is constructed with a roller guard that affords



The Diamond Edge Roller Guard Safety Razor.

a free cutting edge the entire length of the blade, while the blade corners are carefully protected. Two blades are placed in the head of the frame, one on each side of the roller guard, for making either the upward or downward stroke. The point is made that the entire cutting edge of each blade is free from the guard. The razor contains two parts, the frame and the blades. The outfit consists of a triple silver plated frame and handle, triple silver plated stropping handle and 12 sharp hair tested ready to shave blades, all packed in a neat velvet and silk lined all leather case. To encourage retail merchants to make window displays of this line the company pack with each shipment of the razors suggestions and material for making an attractive exhibit.

Rack for Warehouse Trucks.

In the accompanying illustrations are shown a patent steel rack, made by the Western Wheelbarrow & Mfg. Company, Kansas City, Mo., for attachment to warehouse trucks. In Fig. 1 the rack is seen in position for use, while Fig. 2 shows it folded back upon the bed of the truck. This attachment is especially serviceable for the handling of bulky packages, and, being built entirely of steel, is strong enough to sustain several times the weight that it will be required to bear. The side bars of the rack for 19-in. wide trucks are made of $\frac{1}{4}$ x 1 in. steel

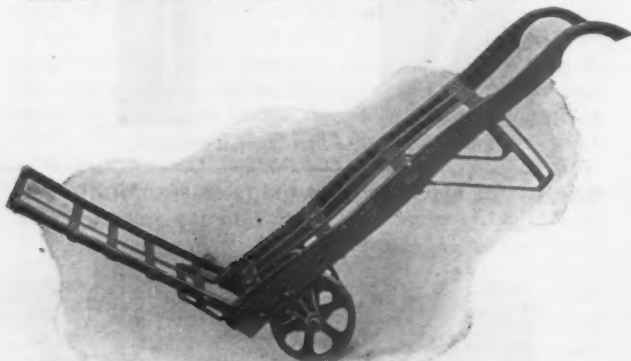


Fig. 1.—Truck with Rack in Use.

bars, while the center and cross bars are $\frac{3}{8}$ x 1 in. by 3-16 x 1 in., respectively. For trucks 20 and 24 in. wide the weight of steel used is proportionately increased. The rack is easily attached to a truck of given size, and closes up like a jack knife so that when folded it does not interfere in any way with the ordinary use of the truck to which it is attached. It is furnished either separate or attached to any standard warehouse truck included in the large line made by the company. The

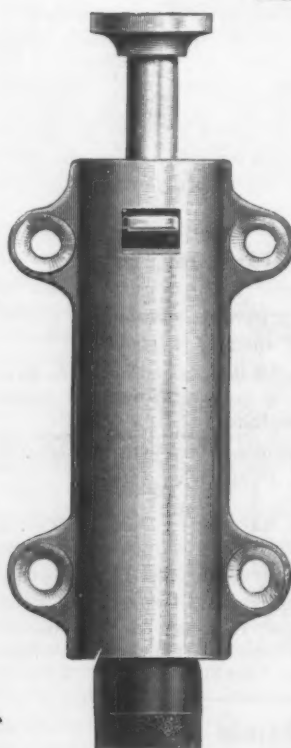


Fig. 2.—Truck with Rack Folded.

only dimension required for fitting to other trucks is the exact width from outside to outside. Special sizes are made to order, but racks are kept in stock for trucks 19, 20, 22 and 24 in. wide, for which the corresponding lengths are 24, 26, 30 and 32 in.

C. C. Pinney of the firm of Brown & Pinney, Stafford Springs, Conn., has sold his interest to H. P. Lovell, and the business will be continued under the name of Brown & Lovell.

Shelby Door Holder.



Shelby Wrought Door Holder.

The Shelby Spring Hinge Company, Shelby, Ohio, is putting on the market an addition to its line of builders' hardware specialties in the door holder here illustrated. It is so constructed that it will hold a door from being moved at any point where it is wished to hold it. On the lower end of the plunger is a rubber tip, and there is a spring concealed in the piston which is said to be constant in action, bringing the holder down in case the floor should be depressed by walking over it or by any temporary weight. The rubber tip can be easily replaced by unscrewing it from a threaded thimble, which holds it in position. The device is manufactured of wrought steel, all finishes, or of brass or bronze metal, and is described as an artistic piece of hardware. It is packed in a single carton complete with screws.

It is packed in a single carton complete with screws.

New Acme Hay Carriers and Steel Track Fixtures.

The Whitman & Barnes Mfg. Company, Chicago, has recently brought out a new line of hay carriers called the New Acme. These carriers are built in four styles, two of which, Nos. 300 and 400, are here illustrated in Figs. 1 and 2. The other two styles, Nos. 100 and 200, differ from these chiefly in that rope is used for their operation instead of iron cable. The carriers are made of malleable iron, with large track wheels mounted on $\frac{1}{8}$ -in. turned steel bearings. The fork pulley sheave and rope wheels



Fig. 1.—New Acme Hay Carrier, No. 300.

are 7 and 6 in. in diameter, respectively, their unusual size tending to lessen the power required to raise the load. Wear on these wheels is reduced and strain on the bolts is relieved by steel bushings recessed into the frame. An important feature of the carrier, which appears in the cut-away section, Fig. 3, is the locking and

gripping mechanism. It is of simple construction, containing only three parts, two gripping dogs and a plunger. In operation the fork pulley when it enters the mouth of the carrier strikes the gripping dogs and forces them out of the plunger at the top into the fork pulley sheave at the bottom. The plunger drops between the gripping dogs the moment they grasp the fork pulley sheave, where they are locked and held securely until the carrier is re-



Fig. 2.—New Acme Carrier, No. 400.

turned to the stop. At this point the plunger is engaged by the stop block, and, being withdrawn from between the gripping dogs, releases the fork pulley. Another feature of advantage noted is that no springs are used in the



Fig. 1.—Marlin Repeating Rifle, Model 25.



Fig. 2.—Model 25, Taken Down.



Fig. 3.—Loading Tube.

construction of this carrier, which is especially fitted for use with wire cable. Fig. 4 represents the New Acme



Fig. 3.—New Acme Carrier, No. 100, Illustrating Locking and Gripping Mechanism.

track coupling, which is attached to the track without bolts. The coupling is composed of malleable blocks

riveted to the side of the track at the overlap. These blocks are beveled on one end so that when two lengths of track are brought together there is an opening between the two blocks tapering from top to bottom of the track. Into this opening a taper plug is driven down tight, making a solid joint. The track itself is held by

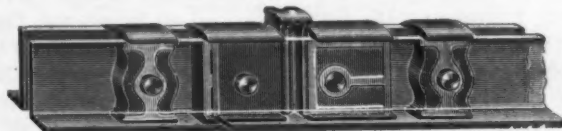


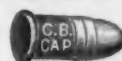
Fig. 4.—New Acme Track Coupling.

hooks nailed to the rafters, and the track is hung after they are in position. The advantage of this is that all the rafter brackets may be nailed to a line, thus insuring the track to be perfectly level.

Marlin .22 Caliber Repeating Rifle, Model 25.

The accompanying illustrations show the new model 25 0.22 caliber repeating rifle which is being put out by the Marlin Fire Arms Company, New Haven, Conn. It will handle besides the regular 0.22 short cartridges, Fig. 4, 0.22 conical bullet caps, Fig. 4, which are loaded with black, semismokeless or smokeless powders, and are described as an exceptionally cheap form of reliable ammunition, being recommended as accurate and satisfactory for gallery work and small game shooting. The loading tube, Fig. 3, accommodates 18 of the C. B. caps at one loading and will also handle, without any change in adjustment, 15 0.22 short cartridges. In construction the arm is said to be similar to the Marlin model 20 repeater, being made of the same high quality material throughout. It has a 23-in. round barrel, with deep Bal-

lard rifling, which is said to give the greatest possible accuracy and add materially to the life of the barrel. A removable side plate admits of taking out all operating parts for cleaning without using tools and also allows the wiping rod to be inserted at one end and drawn entirely through the barrel, thus giving it a quick and thorough cleaning. The gun has a solid top side ejecting



Conical Bullet Cap.



.22 Short Cartridge.

Fig. 4.—Ammunition for Model 25.

construction, which throws the shell away from the shooter instead of into his face, which would interfere with his aim for the next shot. This promotes rapid and accurate firing. For convenience in carrying the gun takes down as shown in Fig. 2. It measures 39½ in. over all and 29¼ in. with butt stock removed, weighing 4 lb. 2 oz. It is said to be perfectly proportioned and finely balanced and up to the Marlin standard in every respect.

The Chesnutt Loading Truck.

The Chesnutt Loading Truck Company, Oklahoma City, Okla., is putting on the market the elevator truck shown in the accompanying illustration. It is designed for use in loading or unloading any heavy articles which can be taken on at a low level and raised or *vice versa*. Fig. 1 illustrates the truck with load on frame, and Fig. 2 the load elevated. Trucks are also built with drop frames, which will receive the load lower down than indicated in Fig. 1, or within 8 or 10 in. of the ground. The capacity of trucks is governed by the size and general uses for which they are intended. One built to carry

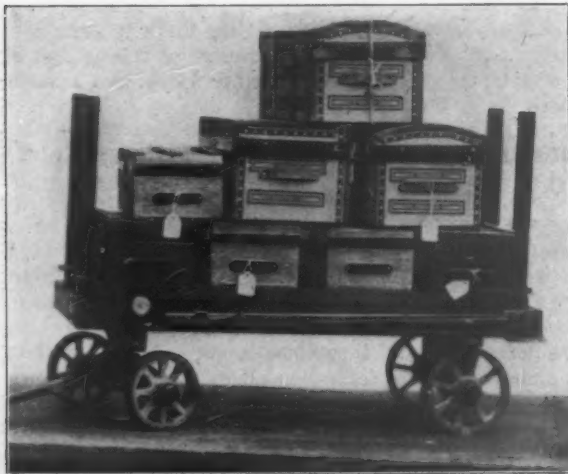


Fig. 1.—The Chesnutt Loading Truck with Load Resting on Frame for Transportation.

a load of, say, 3000 lb., can, it is stated, be operated by one man at a speed of 4-in. lift to each stroke of the lever. On a truck of this size the lift would be to any desired height up to about 10 ft. The truck is said to be very strong in general construction. The frame and chain guides are of angle steel, and all the working parts are of the best material and workmanship. The lifting

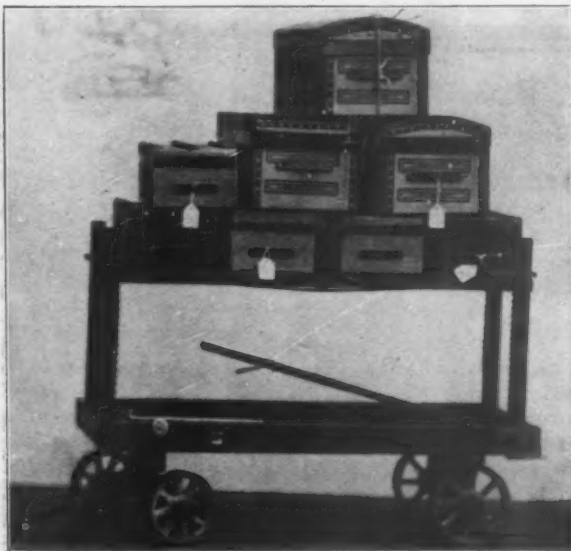


Fig. 2.—The Chesnutt Truck with Load Elevated.

mechanism is said to be simple in construction, and so direct in action as to render its getting out of order a remote possibility. The mechanism in no way interferes with or weakens the general utility or strength of the truck. It is all beneath the platform and confined within the frame. The power for hand machines is a lever working with a ratchet engagement. As the lever is operated the platform is lifted by a chain which is described by the company as a chain that pushes. This chain is, in fact, composed of solid metal blocks joined together and operated by an engaging sprocket. The lifting mechanism is composed of four of these chains, one

at each corner of the truck frame, operated in unison by four sprockets, which are all directly connected with the ratchet lever by shafting and miter gear. As the chain moves forward and upward these links stand one upon the other in a rigid column, and it is declared that the lifting power of even a small chain is limited only by the general structural mechanism of the truck itself. As the load is lifted it is continually sustained by a piston working in an oil cylinder, being drawn out automatically as the load is raised. Because of a specially constructed check valve the oil cannot return to the reservoir until released by the operator, which is done by the use of the valve. This feature, which is described as an application of hydraulics, is said to guarantee absolute safety and enable the operator to lower the load at will without power, stopping at any height desired. As already stated, trucks may be built to elevate to any height. On those designed for unusually high lifts the standard may be jointed or telescoped if the truck is to be taken through doors too low to admit the high standards.

The Resilient Oil Can.

The Ohio Lantern Company, Tiffin, Ohio, is putting on the market the upright wire guarded glass oil can here illustrated. It is now made only in the 1-gal. size. The upright wire guards are bow shaped, giving a resiliency which is said to protect the glass from shocks or blows, making it practically knockproof. There are



The Resilient Oil Can.

no stiff iron ribs against the glass, the ribs being also springy, thus affording increased protection. The jar is of clear glass, and can be removed from the jacket for cleaning when desired. The oil is always in plain sight. The jacket is said to be strongly made, and all parts and guards are nicely tinned and present an attractive appearance. The cans are packed 1 dozen to the case, the shipping weight being 54 lb.

Oxidized Copper and Mission Fireplace Stoves.

The Reznor Mfg. Company, Mercer, Pa., manufacturing the Reznor gas heating stoves, has just brought out some new patterns, one of which is an oxidized copper fireplace stove in four numbers, all 30¼ in. high and 24½, 26½, 28½ and 30½ in. wide. They are built expressly for use in a fireplace with a mantel, the sizes being suitable for the four standard grate openings. A marked feature is that they may be used with a mantel in a room that has no chimney and with either manufactured or natural gas. There is also the Mission design, in four numbers of the same sizes. The parts are hammered out of wrought iron by hand, securely fastened together with mission head bolts, and all finished in dull black. The description of the oxidized copper pattern applies equally to the Mission style, except in design and finish.

Mrs. Vrooman's Sink Strainer with Double Hook.

The Andrews Wire & Iron Works, Rockford, Ill., manufacturer of the Vrooman sink strainer, has improved this product by furnishing it with the new double hook, shown in the accompanying illustration. The company argues that because the corners of enameled sinks are round and not flat it is inconvenient to use a sink strainer with a foot because it will not stay in the corner, but is liable to slip out into the middle of the sink, where it is in the way and there is risk of tipping it over and spilling the contents. The double hook referred to makes it possible to hang the Vrooman strainer on the sink, either on the side or on



Mrs. Vrooman's Sink Strainer with Double Hook.

the corner out of the way, but always ready for use. The hook can be snapped onto either side of the utensil and becomes a part of it rather than a loose hook which will fall off whenever the strainer is removed from the sink. The attachment is furnished with the Vrooman strainer without extra charge.

Chas. Zimmerman & Sons, Baltimore, Md., are erecting a three-story store and warehouse at Pennsylvania avenue and Cumberland street, with a frontage of 31 x 70 ft. on the two streets. There will be three plate glass show windows and elevator. The building will be steam heated and electric lighted. It is the expectation to occupy the new structure about August 1, with a stock of Hardware, Paints, House Furnishings and kindred goods.

Wilkinson, Young & Son is the name of a new firm in Formosa, Kan., which has purchased the Hardware business of C. McCarthy.

PAINTS, OILS AND COLORS

Animal, Fish and Vegetable Oils—		China Clay, Imported		Blue, Ultramarine.....		Black Drop, English.....	
bbl. lots.		per ton		per lb.		per lb.	
Linseed, Western, Raw.....	56 @57	Cobalt, Oxide.....	100 lb 1.45 @ 2.60	Brown, Vandyke.....	11 @14	Black, Ivory.....	16 @30
State, Raw.....	56 @57	Whiting, Commercial.....	100 lb 1.45 @ 2.60	Green, Chrome.....	12 @16	Lamp, commercial.....	4 @6
City, Raw.....	57 @58	Gilders.....	100 lb .52 @ .64	Green, Paris.....	12 @16	Blue, Celestial.....	4 @6
Boiled, 1¢ gal. advance on Raw.....	47 @49	Ex. Gilders.....	100 lb .56 @ .68	Sienna, Raw.....	12 @15	Blue, Chinese.....	30 @31
Raw, Calcutta, in bbls.....	75 @76	Putty, Commercial— per 100 lb		Umber, Raw.....	11 @14	Blue, Prussian, Domestic.....	28 @30
Lard, Prime, Winter.....	80 @83	In bladders.....	\$1.70 @ 2.00	Umber, Burnt.....	11 @14	Blue, Ultramarine.....	5 @15
Extra No. 1.....	52 @53	In bbls. or tubs, 100 lb.....	1.20 @ 1.45	White and Red, Lead &c.—		Brown, Spanish.....	1/2 @ 1
No. 1.....	47 @49	In 1 lb to 5 lb tins.....	2.65 @ 3.25	Lead, English white, in Oil, 10% @ 10%		Carmine, No. 40.....	\$3.00 @ 5.10
Cotton-seed, Crude, f.o.b. mill.....	35 @36	In 12 1/2 to 50 lb tins.....	1.50 @ 1.90	Lead, American White:		Green, Chrome, ordinary.....	3/4 @ 5
Summer, Yellow, prime.....	5.85 @ 6.90	Spirits Turpentine— per gal.		500 lb kegs.....	6%	Green, Chrome, pure.....	17 @25
Summer, White.....	6.10 @ 6.30	In Machine bbls.....	41 @ 41 1/2	Dry and in Oil, 100, 250 and		Ocher, American.....	per ton \$12.00 @ 15.00
Yellow Winter.....	6.05 @ 6.40	In Oil bbls.....	41 1/2 @ 42	500 lb kegs.....	6%	American Golden.....	4 @ 5
Tallow, Acidless.....	56 @57	Glue— per lb		Dry and in Oil, 25 and 50		French.....	14 @ 2
Menhaden, Brown, Strained.....	32 @33	Cabinet.....	12 @15	lb kegs.....	7	Foreign Golden.....	3 @ 4
Northern, Crude.....	32 @33	Common Bone.....	7 1/2 @ 9	Dry and in Oil, 12 1/2 lb kegs.....	7 1/2	Orange Mineral, English.....	10 @12
Southern.....	32 @33	Extra White.....	18 @24	Dry and in Oil, 25 lb tin pails.....	7 1/2	French.....	12 1/2 @13
Light Strained.....	32 @33	Fish, liquid, 50 gal. bbls., per gal.	10 @12	In Oil, 12 1/2 lb tin pails.....	7 1/2	German.....	12 @13
Bleached Winter.....	36 @37	Foot Stock, White.....	12 @14	In Oil, 1, 2, 3 and 5 lb tin		American.....	8 1/2 @10
Extra Bleached Winter.....	38 @39	Foot Stock, Brown.....	9 @11	cases, ass't.....	8%	Red, Indian, English.....	5 @ 7
Cocunut, Ceylon.....	10 @11	German Common Hide.....	10 @12	Red Lead and Litharge:		American.....	3 @ 3 1/2
Cochin.....	10 @11	French Hide.....	10 @10	In 100 lb kegs.....	7	Red, Turkey, English.....	4 @10
Cod, Domestic, Prime.....	38 @39	Irish.....	13 @16	In 25 and 50 lb kegs.....	7 1/2	Red, Tuscan, English.....	7 @10
Newfoundland.....	40 @41	Low Grade.....	10 @12	In 12 1/2 lb kegs.....	7 1/2	Red, Venetian, Amer.....	per 100 lb \$0.75 @ 1.50
Red Elaine.....	43 @44	Medium White.....	14 @19	In lots of less than 500 lbs.		English.....	per 100 lb \$1.15 @ 1.50
Saponified.....	5 1/2 @ 6%	Gum Shellac—		1/2 c @ 1 lb advance over		Sienna, Italian, Burnt and	
Olive, Yellow.....	55 @56	Bleached, Commercial.....	16 @16 1/2	above prices of White and		Powdered.....	3 @ 9
Neatsfoot, Prime.....	55 @56	Bone Dry.....	20 @21	Lead, American. Terms: On lots of		Italian, Raw, Powdered.....	3 @ 7
Palm, Lagos.....	5.60 @ 5.65	Button.....	20 @21	500 lbs and over, 60 days, or 2% for		American, Raw.....	3 @ 7
Mineral Oils—		Diamond I.....	27 @28	cash if paid in 15 days from date of		American Burnt and Pow'd.....	2 1/2 @ 3
Black, 29 gravity, 25 @ 30 cold	12 1/2 @ 13	Fine Orange.....	20 @21	invoice.		Talc, French.....	per ton \$18.00 @ 25.00
test.....	13 1/2 @ 13 3/4	A. C. Garnet.....	15 1/2 @ 16	Zinc, Dry—		American.....	per ton 15.00 @ 25.00
29 gravity, 15 cold test.....	12 @12 1/2	Light Orange.....	17 @19	American, dry.....	5 1/2 @ 5 1/2	Terra Albe, French.....	per 100 lb .80 @ 1.00
Summer.....	12 @12 1/2	Kala Button.....	10 @11	Red Seal (French process).....	6 1/2 @ 7	English.....	per 100 lb .90 @ 1.00
Cylinder, light filtered.....	20 @20 1/2	D. C.....	27 @28	Green Seal.....	7 1/2 @ 7 1/2	American.....	per 100 lb, No. 1, 75 @ .80
Dark, filtered.....	17 1/2 @ 18	Octagon B.....	22 @23	White Seal.....	8 1/2 @ 9	American.....	per 100 lb, No. 2, 60 @ .65
Paraffine, 903-907 sp. gravity.....	14 @14 1/2	T. N.....	14 @15	French, Red Seal.....	8 1/2 @ 8 1/2	Umber, T'key, Rnt. & Pow.....	2 1/2 @ 3
903 sp. gravity.....	13 @13 1/2	V. S. O.....	25 @26	Green Seal.....	10% @ 10%	Turkey, Raw and Powdered.....	2 1/2 @ 3
883 sp. gravity.....	10 1/2 @ 11	Colors in Oil—		White Seal.....		Burnt, American.....	2 @ 2 1/2
Red.....	13 @13 1/2	Black, Lampblack.....	12 @14	French, Red Seal.....		Raw, American.....	2 @ 2 1/2
Miscellaneous—		Blue, Chinese.....	36 @46	Green Seal.....		Yellow, Chrome, Pure.....	12 1/2 @ 14
Barites:		Blue, Prussian.....	32 @36	Dry Colors—		Oxide Red, American.....	2 @ 7 1/2
White, Foreign.....	per ton \$18.50 @ 20.50	Colors in Oil—		Black, Carbon.....	6 1/2 @ 10	Vermilion, English, Imported.....	@ 70
Amer., floated.....	per ton 17.00 @ 18.00	Black, Lampblack.....	12 @14	Black Drop, American.....	3 1/2 @ 8	Chinese.....	\$0.90 @ 1.50
Off color.....	per ton 12.50 @ 15.00	Blue, Chinese.....	36 @46				
Chalk in bulk.....	per ton 3.00 @ 3.10	Blue, Prussian.....	32 @36				

THE IRON AGE

The oldest paper in the world devoted to the interests of the Hardware, Iron, Machinery and Metal Trades, and a standard authority on all matters relating to those branches of industry.

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Current Hardware Prices.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer—are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are usually given to larger buyers.

Special Goods.—Quotations printed in small type (Roman) relate to goods of particular manufacturers, who request the publication of the prices named and are responsible for their correctness. They usually represent the prices to the small trade, lower prices being generally obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33% @ 33% & 10% signifies

that the price of the goods in question ranges from 33% per cent. discount to 33% and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued annually, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—"The Iron Age Standard Hardware Lists" contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Adjusters, Blind—

Columbiad and Domestic.....33%
North's.....10%
Upson's Patent, 1/2 gro., \$2.00.....10%
Zimmerman's—See Fasteners, Blind.

Window Stop—

Ives' Patent.....10%
Ives' Stop Head Screws and Washers.....10%
Taplin's Perfection.....10%

Ammunition—See Caps, Cartridges, Shells, &c.

Anti-Rattlers—

Fernald Mfg. Co. Burton Anti-Rattlers, 1/2 doz. pairs, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Anvils—American—

Eagle Anvils.....10%
Hay-Budden, Wrought.....10%
Trenton.....10%

Imported—

Swedish Solid Steel Paragon, 1/2 lb.....10%
Swedish Solid Steel Sisco, Superior, 1/2 lb.....10%
Wright & Sons, 1/2 lb.....10%

Anvil, Vice and Drill—

Millers Falls Co., \$18.00.....15%
10%

Apple Parers—See Parers, Apple, &c.

Aprons, Blacksmiths'—

Livingston Nail Co.....10%

Augers and Bits—

Com. Double Spur.....30%
Jennings' Patn., Bright.....65%
Black Lip or Blued.....65%
Boring Mach. Augers.....70%
Car Bits, 12-in. twist.....40%
Ford's Auger and Car Bits.....40%
Ft. Washington Auger Co., Concord's.....35%
Forstner Pat. Auger Bits.....25%
C. E. Jennings & Co., No. 10 ext. lip, R. Jennings' list.....25%
No. 30, R. Jennings' list.....50%
Russell Jennings' list.....50%
L'Hommedieu Car Bits.....15%
Mayhew's Countersink Bits.....15%
Fugh's Blacksmith's Pattern.....50%
Fugh's Jennings' Pattern.....50%
Snell's Auger Bits.....60%
Snell's Bell Hangers' Bits.....60%
Snell's Car Bits, 12-in. twist.....60%
Snell's King Auger Bits.....50%
Swan's, Jennings' Pattern.....50%
Wright's Jennings' Bits.....50%

Bit Stock Drills—

See Drills, Twist.

Expansive Bits—

Clark's Pattern, No. 1, 1/2 doz., \$36.....60%
Ford's, Clark's Pattern.....60%
C. E. Jennings & Co., Steer's Pat. 25% size, \$36.00.....60%
Swan's.....60%

Gimlet Bits—

Common Dbl. Cut.....\$3.00@3.25
German Pattern, Nos. 1 to 10, \$4.75; 11 to 13, \$5.75

Hollow Augers—

Bonney Pat., per doz. \$5.50@6.00

Ship Augers and Bits—

Ship Augers.....40%
Ford's.....35%
C. E. Jennings & Co., L'Hommedieu's.....6%
Watrous'.....33%
Snell's.....48%

Awl Hafts—See Handles, Mechanics' Tool.

Awls—

Brad Awls: Handled.....gro. \$2.75@3.00
Unhandl. Shl'dered.....gro. \$3.00@3.25
Unhandl. Patent.....gro. \$3.00@3.25

Scratch Awls—

Handled, Com.gro. \$3.50@4.00
Handled, Rocket.....gro. \$11.00@12.00
Elmore Tool Mfg. Co., Timmers' and Brad Awls.....\$5.75
Scratch Awls.....60%

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

Single Bit, base weights: Per doz. First Quality.....\$4.75@5.00
Second Quality.....\$4.25@4.50
Double Bit, base weights: First Quality.....\$7.00@7.50
Second Quality.....\$6.50@6.75

Axle Grease—

See Grease, Axle.

Axles—

Concord, Loose Collar.....4%
Concord, Solid Collar.....4%
No. 1 Common, Loose.....3%
No. 1 1/2 Com., New Style.....4%
No. 2 Solid Collar.....4%
Half Patent: Nos. 7, 8, 11 and 12.....70%
Nos. 13 to 15.....70%
Nos. 15 to 18.....70%
Nos. 19 to 23.....70%

Boxes, Axles—

Common and Concord, not turned.....lb., \$6.66
Common and Concord, turned, lb., \$6.76
Half Patent.....lb., 9% @ 10%

Bait—

Hendryx: A Bait.....20%
B Bait.....25%
Competitor Bait.....20%

Balances—

Caldwell new list.....50%
Pullman.....50%

Spring—

Light Spring Balances.....60%
Chatillon's: Light Spg. Balances.....50%
Straight Balances.....40%
Circular Balances.....50%
Large Dial.....30%

Barb Wire—See Wire, Barb.

Bars—

Steel Crowbars, 10 to 40 lb. per lb., 2% @ 2 1/4%

Towel—

No. 10 Ideal, Nickel Plate.....1/2 gro. \$8.50

Beam, Scale—

Scale Beams.....40%
Chatillon's No. 1.....30%
Chatillon's No. 2.....40%

Beaters, Carpet—

Holt-Lyon Co.: No. 12 Wire Coppered 1/2 doz. \$0.80
Tinned.....\$0.85
No. 11 Wire Coppered 1/2 doz. \$1.15
Tinned.....\$1.20
No. 10 Wire Tinned.....1/2 doz. \$1.50

Beaters Egg—

Dover Stamping & Mfg. Co.: Genuine Dover, per gro. No. 1, Tumbler Size, \$1.50; No. 2, Family Size, \$1.50; No. 3, Extra Family Size, \$1.50; No. 4, Hotel Size, \$3.00.

Holt-Lyon Co.: Holt, per doz., No. 5, Jap'd. \$0.80; No. A, Jap'd. \$1.15; No. B, Jap'd. \$1.65; No. 6, Jap'd. \$1.65.

Lyon, Jap'd, per doz., No. 2, \$1.35.

Taplin Mfg. Co.: Improved Dover, per gro. No. 60, \$6.00; No. 75, \$6.50; No. 100, \$7.00.

No. 122, Tin'd. \$5.50; No. 150, Hotel, \$15.00; No. 152, Hotel, Tin'd. \$17.00; No. 200, Tumbler, \$3.80; No. 222, Tumbler Tin'd. \$9.50; No. 300, Mammoth, per doz., \$23.00.

Bellows—

Blacksmith Standard List: Split Leather.....60%
Grain Leather.....50%

Hand—

Inch.....6 7 8 9 10
Doz. \$5.00 5.50 6.00 6.50 7.50

Molders—

Inch.....10 12 14 16
Doz. \$7.50 9.00 12.00 13.00

Bells—

Wrought Cow Bells.....75%
Jersey.....75%
Texas Star.....50%

Door—

Home, R. & E. Mfg. Co.'s.....50%

Hand—

Polished, Brass.....60%
White Metal.....60%
Nickel Plated.....50%
Sicks.....50%
Coue's Globe Hand Bells.....33%

Miscellaneous—

Farm Bells.....lb., 2 1/4 @ 2 1/2¢
Church and School.....60%

Belting—

First Quality, Ex. Hy., Strictly Short Lap.....60%

Standard.....70%
Light Double.....75%
Cut Leather Lacing.....45%
Leather Lacing Sides, per sq. ft. 25¢

Rubber—

Competition (Low Grade).....70%

Standard.....60%
Best Grades.....40%

Bench Stops—

See Stops, Bench

Benders and Upsetters, Tire—

Green River Tire Benders and Upsetters.....20%

Bicycle Goods—

John S. Leng's Son & Co.'s 1908 list: Chain, Parts, Spokes.....50%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See Augers and Bits.

Blocks Tackle—

Common Wooden.....75%

B. & L. B. Co.: Boston Wood Snatch, 50%; Eclipse Steel, 75%; Hollow Steel, 50%
Wire Rope, 50%; Turbox Metal Snatch, 50%; Tarbox New Style Steel, 50%; Wire Rope Snatch, 50%.

Lane's Patent Automatic Lock and Junior.....30%

See also Machines, Hoisting.

Boards, Stove—

Paper and Wood Lined.....55%

Boards, Wash—

See Washboards.

Bobs, Plumb—

Kenell & Esser Co.....33%

Boils

Carriage, Machine, &c.—Common Carriage (cut thread): 3/4 & 6 and smaller.....75%
Larger and longer.....70%
Common Carriage (rolled thread): 3/4 & 6, smaller and shorter.....75%

Phila. Eagle, \$3.00 list.....80%
Bolt Ends, with O. & T. Nuts.....70%

Machine (Cut Thread): 3/4 & 6 and smaller.....75%
Larger and longer.....70%

Door and Shutter—

Cages, Bird—

Hendryx Brass: Series 3000, 5000
1100, net list; 1200, 15%; 200, 300
300
Hendryx Bronze: Series 700, 800...
Hendryx Enamelled... 3%

Calipers—See Compasses**Calks, Toe and Heel**

Blunt, 1 prong, per 100 lb., \$3.50 @ 3.85
Sharp, 1 prong, per 100 lb., \$3.00 @ 3.25

Burke's, 1 pg. Blunt Toe, 3/4"; 2 pg. Blunt Toe, 1/2"; 1 pg. Sharp Toe, 1/2"; 2 pg. Sharp, 1/2"; Blunt Heel, 1/2"; Sharp Heel, 1/2"; Lautier, Blunt, 1/2"; Sharp, 1/2"; Perkins, Blunt, 1/2"; Sharp, 1/2"

Can Openers—

See Openers, Can.

Caps, Percussion—

Eley's E. B. 52 @ 55¢
G. D. per M. 31 @ 35¢
F. L. per M. 40 @ 42¢
G. E. per M. 48 @ 50¢
Musket per M. 62 @ 63¢

Primers—

Berdan Primers, \$2 per M. 20¢
Primer Shells and Bullets, 15¢
All other primers per M. \$1.52 @ 1.60

Carpet Stretchers—

See Stretchers, Carpet.

Cartridges

Blank Cartridges:
32 C. F., \$3.50 10¢
32 C. F., \$7.00 10¢
22 cal. Rim, \$1.50 10¢
22 cal. Rim, \$2.75 10¢
B. B. Caps, Con. Ball, Sued. \$1.20
B. B. Caps, Round Ball, 25¢
Central Fire 15¢
Target and Sporting Rifle, 15¢
Primed Shells and Bullets, 15¢
Rim Fire, Sporting, 30¢
Rim Fire, Military, 15¢

Casters—

Red 65¢ @ 70¢
Plate 60¢ @ 65¢
Philadelphia 70¢ @ 75¢
Acme Ball Bearing, 35¢
Gem (Roller Bearing), 70¢ @ 10¢
Steel Gem (Roller Bearing), 70¢
Standard Ball Bearing, 40¢
Yale (Double Wheel) low list, 40¢

Cattle Leaders—

See Leaders, Cattle.

Chain, Proof Coil—

American Coil, Straight Link:
3-16 1/4 5-16 3/4 3/8 3.00
3-16 1/4 5-16 3/4 3/8 3.10 3.00
1-1/2 1 1/2 1 1/2 1 1/2 1 1/2 3.00
Lower prices in cask lots f.o.b. factory.

German Coil, 70¢
German Pattern Coil:
6-0 to 1, 70¢ @ 10¢
2 and 3, 60¢ @ 10¢
4, 5 and 6, 50¢ @ 10¢

Halter—

Halter Chains, 60¢ @ 60¢
German Pattern Halter Chains,
list July 24, '97, 70¢
Covert Mfg. Co., 35¢

Cow Ties—

See Halters and Ties.

Trace Wagon, &c.—

Traces, Western Standard: 100 pr.
6-1/2-6-1/2, Straight, with ring, \$26.00
6-1/2-6-1/2, Straight, with ring, \$27.00
6-1/2-6-1/2, Straight, with ring, \$30.00
6-1/2-10-2, Straight, with ring, \$35.00
NOTE—Add 2¢ per pair for Hooks
Twist Traces—add 2¢ per pair for Nos. 2
and 3; 2¢; No. 1, 2¢; No. 0, 4¢ to price of
Straight Link.

Eastern Standard Traces, Wag-
on Chain, &c., 70¢ @ 10¢

Miscellaneous—

Jack Chain, list July 10, '93:
Iron 60¢ @ 10¢
Brass 65¢
Safety and Plumbers' Chain, 75¢
Gal. Pump Chain, 1/2 @ 60¢
Bridgeport Chain Co.:
Triumph Halter and Coll., 35¢ @ 40¢
Triumph Dog, 70¢ @ 60¢
Brown Halter and Coll., 35¢ @ 40¢
Covert Mfg. Co.:
Bronze Halter, Heel, Rein, Stal-
lion 40¢
Oneida Community:
American Halter, Dog and Kennel
Chains 35¢ @ 40¢
Niagara Dog Leads and Kennel
Chains 45¢ @ 55¢
Wire Goods Co.:
Dog Chain, 70¢
Universal Dbl. Jointed Chain, 70¢

Chain and Ribbon, Sash—

Oneida Community:
Steel Chain, 60¢
Pullman:
Bronze Chain, 60%; Steel Chain,
Coppered 60¢ @ 10¢
Sash Chain Attachments, per set, 8¢
Aluminum Sash Ribbon, per 100
ft. \$2.00 @ 2.50
Sash Ribbon Attachments, per set, 8¢

Chalk—

Carpenters' Blue, 50¢ @ 55¢
Carpenters' Red, 50¢ @ 55¢
Carpenters' White, 50¢ @ 55¢

Checks, Door—

Bardley's 45¢
Pullman, per gro. \$4.00
Russwin 30¢

Chests, Tool—

American Tool Chest Co.:
Boys' Chests, with Tools, 55¢
Youths' Chests, with Tools, 40¢
Gentlemen's Chests, with Tools, 30¢
Farmers', Carpenters', etc., Chests,
with Tools 20¢
Machinists' and Pipe Fitters'
Chests, Empty 45¢
Tool Cabinets, 45¢
C. E. Jennings & Co.'s Machinists'
Tool Chests 75¢

Chisels

Socket Framing and Firmer
Standard List, 80¢ @ 10¢
Buck Bros. 30¢
C. E. Jennings & Co.:
Socket Firmer No. 10, 25¢ @ 75¢
Socket Framing No. 15, 25¢ @ 75¢
Swan's 60¢ @ 70¢
L. & J. White & Co. 20¢ @ 35¢

Tanged—

Tanged Firmers, 30¢ @ 45¢
Buck Bros. 30¢
C. E. Jennings & Co. Nos. 191, 181, 25
L. & J. White Co. 25¢

Cold—

Cold Chisels, good quality, 13¢ @ 15¢
Cold Chisels, fair quality, 11¢ @ 12¢
Cold Chisels, ordinary, 9¢ @ 10¢
Elmore Tool Mfg. Co.:
Cold Chisels, 50¢ @ 55¢

Chucks—

Almond Drill Chucks, 35¢
Almond Turret Six-Tool Chuck, 40¢
Beach Pat, each \$8.00, 35¢
Blacksmiths' 25¢
Cincinnati Chuck Co.:
Independent Jaw Reversible, 35¢
Empire 35¢
Jacobs' Drill Chucks, 35¢
Pratt's Positive Drive, 25¢
Skinner Lathe Chucks:
Independent 35¢
Universal, Com. Style Jaws, 40¢
Combination, Reversible Jaws, 35¢
Combination, Com. Style Jaws, 40¢
Round Body or Box Body, 2 Chuck
Jaws 25¢
Geared Scroll Chucks, 25¢
Drill Chucks:
New Model, 25%; Geared Pat-
tern, 25%; Skinner Patent, 25¢
Positive Drive, 40¢
Planer Chucks, 20¢
Standard 45¢
Drill Press Vises, 35¢
Face Plate Jaws, 35¢
Standard Tool Co.:
Improved Drill Chuck, 45¢
Union Mfg. Co.:
Combination, Nos. 1, 2, 3, 4, 5, 6,
7, 8 and 17, 40%; No. 21, 35¢
Scroll Combinations, Nos. 83 and
84, 35¢
Geared Scroll, Nos. 33, 34 and 35, 25¢
Independent Steel, Nos. 18 and 318, 35¢
Independent Steel, No. 61, 25¢
Union Drill, Nos. 000, 00, 100, 101,
102, 103, 104, 35¢
Union Car, 25¢
Universal, 12, 16, 17, 13, 11, 15, 35¢
Iron Face Plate Jaws, Nos. 28, 30,
48 and 50, 35¢
Steel Face Plate Jaws, Nos. 70 and
72, 30¢
Westcott Patent Chucks:
Lathe Chucks, 50¢
Little Giant Auxiliary Drill, 50¢
Little Giant Double Grip Drill, 50¢
Little Giant Drill, Improved, 50¢
Oneida Drill, 50¢
Scroll Combination Lathe, 50¢
Whitaker Mfg. Co.:
National Drill, 25¢

Clamps—

Carriage Makers', Star, P. S. & W.
Co., 50¢
Realy, Parallel, 35¢ @ 10¢
Hammer & Co.:
Adjustable 20¢ @ 5¢
Carriage Makers' H. P. Screw, 40¢ @ 5¢
Myers' Hay Rack, 40¢
Lineman's Swedish Neverturn, 45¢
Saw Clamps, See Vises, Saw Filers.

Cleaners, Drain—

Ivan's Champion, Adjustable, 50¢
Ivan's Champion, Stationary, 40¢

Chain and Ribbon, Sash—

American Fork & Hoe Co.:
Star, 3/4 doz., Socket, \$4.00,
Shank, 3/4 doz., X 7/8, \$3.50; Shank,
X 8, \$3.75

Cleavers, Butchers—

Foster Bros. 30¢
Fayette R. Plumb, 30¢
L. & J. White Co. 30¢

Clippers, Horse and**Sheep—**

Chicago Flexible Shaft Co.:
1902 Chicago Horse, each, \$10.75
20th Century Horse, each, \$5.00
Lightning Belt Horse, each, \$15.00
Chicago Belt Horse, each, \$20.00
Stewart's Enclosed Gear Ball
Bearing Horse, each, \$7.50
Stewart's New Model Sheep
Shearing Machine, each, \$12.75
Stewart Enclosed Gear Shear-
ing Machine, No. 8, each, \$9.75

Clips, Axle—

Regular Styles, list July 1, '05,
80¢ @ 10¢

Cloth and Netting, wire**Cocks, Brass—**

Hardware list:
Plain Bibbs, Globe, Kerosene,
Racking, Liquor, Bottling,
&c. 75¢
Compression Bibbs, 70¢

Coffee Mills—

See Mills, Coffee.

Collars, Dog—

Nickel Chain, Walter B. Stevens &
Son's list, 40¢
Leather, Walter B. Stevens & Son's
list, 40¢

Compasses, Dividers, &c.

Ordinary Goods, 75¢ @ 1.50

Conductor Pipe, —

L. O. L. to Dealers

Gal. Steel, Charcoal, Copper.

Northeastern: 50¢ @ 10¢

Eastern: 50¢ @ 10¢

Central: 50¢ @ 10¢

Northwestern: 50¢ @ 10¢

Tennessee: 50¢ @ 10¢

Southern: 50¢ @ 10¢

Southwestern: 50¢ @ 10¢

70¢ @ 10¢

Terms, 60 days: 2% cash 10 days. Fac-
tory shipments generally delivered.

See also Eave Troughs.

Coolers, Water—

L. & G. Mfg. Co.:
Gal. 2 3 4 6 8
Galvanized, ea. \$1.85 \$2.00 \$2.25 \$2.50 \$3.00
Galvanized, Lined, side handles,
Gal. 2 3 4 6 8
Each \$1.95 \$2.15 \$2.40 \$3.30 \$4.15
White Enamelled, 10¢
Agate Lined, 10¢

Coppers' Tools—

See Tools, Coppers'.

Coppers, Soldering—

Soldering Coppers, 3 lb. to pair
and heavier, 21¢; lighter
than 3 lb. to pair, 23¢

Cord—

Braided, Drab, 1b. 35¢
Braided, White, Com., Nos. 8
to 12, 21¢; No. 7, 21¢; No. 6,
23¢. In lots of 12 doz. or
over, 1 cent less per pound.

Cable Laid Italian, lb., No. 18, 37¢
Italian, lb., No. 18, 25¢; B. 22¢
Common India, lb., 11¢ @ 11¢
Cotton Sash Cord, Twisted, 18¢ @ 20¢
Patent Russia, 1b. 20¢
Cable Laid Russia, 1b. 21¢
India Hemp, Br'd'd, 1b. 21¢
India Hemp, Twisted, 1b. 13¢ @ 14¢
Patent India, Twisted, 1b. 17¢
Pearl Braided, cotton, No. 6, 3/4 lb.
20¢; No. 7, 19¢; Nos. 8 to 12,
19¢; in 12 doz. to 100 doz. lots,
Eddystone, Braided, Nos. 8 to 12,
26¢; 7, 26¢; 6, 27¢.
Harmony Cable Laid Italian, No. 7
Fullman, 1b. 23¢

Wire Sash Cord, 10¢
Sash Cord Attachments, per 100, \$2.00

Samson, Nos. 8 to 12:
Braided, 3/4 lb. Drab Cotton,
50¢; Italian Hemp, 40¢ @ 45¢
50¢; Linen, 65¢; White Cot-
ton, 50¢; Spot Cord, 50¢
Massachusetts, White, 3/4 lb. 40¢
Massachusetts, Drab, 3/4 lb. 45¢
Phoenix, White, Nos. 8 to 12, 27¢
Silver Lake, per lb.:
A. Drab, 45¢; A. White, 40¢;
B. Drab, 40¢; B. White, 35¢;
Italian Hemp, 40¢; Linen, 57¢
See also Chain and Ribbon.

Wire, Picture—

Full Length, 90¢ @ 10¢
Short Length, 90¢ @ 10¢
Hendryx Standard Wire Picture Cord,
. 90¢ @ 10¢
Turner & Stanton Co. Wire Picture
Cord 90¢

Cradles—

Grain 50%

Crayons—

White Round Crayons, Cases, 100
gro., \$5.00, \$3.50, \$9.00 and \$10.00
according to grade.

Zelicker's Lumber:
White and Purple, Indelible, \$7.50
Blue, Red, Green, Yellow and
Terra Cotta, \$6.50; Black, \$4.50
Giant Lumber, 5/4 in. x 15-16 in.
round, all colors, \$12.00; Indeli-
bles, \$14.00; Blacks, \$10.00
Genuine Soapstone, Metal Workers',
3 in. x 1/2 in. Round, \$2.50; 5 in. x
1/2 in. Square, \$1.75; 5 x 1/2 x 3-16,
\$2.50; 6 x 1/4 x 3-16, \$3.00
Suremark, Black, \$2.25; Blue, Red
and Yellow, \$2.50

Crooks, Shepherds—

American Fork & Hoe Co.:
Montana 3/4 doz. \$1.50

Crow Bars—See Bars, Crow.**Cultivators—**

American Fork & Hoe Co.:
Victor Garden, 50¢ @ 10¢

Cutlery, Table—

International Silver Company:
No. 12 M'd'm Knives, 1847, 3/4 doz. \$3.50
Star, Eagle, Rogers & Hamilton
and Anchor, 3/4 doz. \$3.00
Wm. Rogers & Son, 3/4 doz. \$2.50

Cutters—**Glass—**

H. H. Mayhew Co., 40¢
Red Devil, 60¢
B. Mfg. Co., 40¢
Woodward, 50¢

Meat and Food—

American 30¢
Nos. 401 402 403 404 405 406 407
Each \$5 \$7 \$10 \$12 \$25 \$30 \$60
Enterprise 10¢
Nos. 5 10 12 22 32
Each \$2 \$3 \$2.75 \$4.50 \$9 25¢ @ 75¢
No. 202, 11.50 10¢ @ 75¢
P. S. & W. Co.:
Ideal 10¢ @ 10¢
Hales 60¢ @ 55¢

Little Giant, 3/4 doz. 40¢ @ 50¢
Nos. 305 310 312 320 322
\$35.00 \$48.00 \$44.00 \$72.00 \$68.00
New Triumph No. 605, 3/4 doz. \$24.00, 40%

Russwin Food, No. 1, \$24.00; No. 2,
\$27.00; 3, \$42.00, 15¢ @ 10¢
Enterprise Beef Shavers, \$15.00 \$18.00
. 25¢ @ 30%

Siaw and Kraut—

Henry Diston & Sons:
Siaw and Kraut Cutters, 35¢
Corn Graters, 25¢
J. M. Mast Mfg. Co.:
Siaw Cutters, 1 Knife, 3/4 doz. \$3.00
Combined Siaw Cutter and Corn
Grater 3/4 doz. \$4.00

Tobacco—

All Iron, Cheap, 3/4 doz. \$4.25 @ 4.50
Enterprise 25¢ @ 30%
National, 3/4 doz., No. 1, \$21; No. 2,
\$18 10%

Diggers, Post Hole, &c—

Diston's:
Rapid, 3/4 doz., \$24.00, 25¢
Samson, 3/4 doz., \$34.00, 25¢
Ivan's Pat. Post Hole and Well
Auger 40¢
Vaughan Pattern Post Hole Augers,
3/4 doz., \$7.00
Perfection Post Hole Diggers, 3/4
doz., \$8.50
Split Handle Post Hole Diggers,
3/4 doz., \$7.50
Hercules Pattern, 3/4 doz., \$9.50
Kobler's, 3/4 doz., Universal, \$14.00;
Little Giant, \$12.00; Hercules,
\$10.00; Invincible, \$9.00; Rival,
\$8.50; Pioneer, \$7.50
Never-Break Crucible Steel Post
Hole Diggers, 60%

Dividers—See Compasses.**Drawing Knives—**

See Knives, Drawing.

Dressers Emery Wheel—

Sterling Emery Wheel Dressers, 35¢
Sterling Wheel Dresser Cutters, 35¢

Drills and Drill Stocks—

Blacksmith's Common Drilling
Machines \$1.50 @ 1.75
Breast, Millers Falls, 15¢ @ 10¢
Breast, P. S. & W. 35¢
C. & C. Ratchet, Die Stocks, 25¢
Reversible Ratchet Die Stocks, 25¢
Goodell Automatic Drills, 50¢ @ 10¢
Millers Falls Automatic Drills,
Graves, per doz., Nos. 1, \$4.86;
2, \$8.16.
Millers Falls Automatic Drills, 35¢ @ 10¢
Ratchet, Curtis & Curtis, 25¢
Ratchet, Parker's, 40¢
Ratchet, Weston's, 40¢
Ratchet, Weston's, Style II Im-
proved, 40¢ @ 45¢
Ratchet, No. 012, 40¢ @ 45¢
Ratchet, Celebrated, 40¢ @ 45¢
Ratchet, Whitney's, P. S. & W.,
. 40¢ @ 50%
Whitney's Adjustable, No. 10, \$12.00,
. 33%

Twist Drills—

Bit Stock, 70¢ @ 70¢ @ 10¢
Taper and Straight Shank
. 65¢ @ 65¢ @ 10%

Drivers, Screw—

Scene D'eer Bits, per doz. 45¢ @ 50¢
Balsey's Screw Holder and Driver, 3/4
doz., 2 1/2-in., \$6; 4-in., \$7.50; 6-in.,
\$9
Buck Bros', Screw Driver Bits, 30¢
Champion 50¢
Diston's Screw Drivers, Handles
and Ferrules 70¢
Elmore Tool Mfg. Co.:
Elmore 60¢
Hartford 65¢
Indestructible 55¢ @ 75¢
Standard Neverturn, 65¢
Star 75¢ @ 55¢
Screw Driver Bits, 25¢
Fray's Hol. H'lle Sets, No. 3, \$12.50;
Ford's Brace Screw Drivers, 10¢ @ 10¢
Gay's Double Action Ratchet, 35¢
Goodell's Auto, 65¢ @ 65¢ @ 10¢
Mayhew's Black Handle, 40¢
Mayhew's Monarch, 40¢
Millers Falls, 3/4 doz., Nos. 11, \$9.95;
12, \$13.75; 20, \$8.17; 2

10-lb. cans, 10 in case... 6 1/2¢ 7¢ 8¢
 10-lb. cans, less than 10... 10¢ 10¢ 8¢
 Less quantity, 10¢ 10¢ 8¢
 NOTE.—In lots 1 to 3 tons a discount of 10% is given.

Extensions, Bit—

Ford's Auger Bit Extensions... 40¢5%
Extractors, emon Juice—
 —See Squeezers, Lemon.

Fasteners, Blind—

Zimmerman's Jap'd and Galv., 50 & 5%
 Bronze and Plated... 50%
 Walling's Patent... 50%
 Upson's Patent... 40%

Cord and Weight—

Ires, # gro., \$1.08... 10%
 Titan, # gro., \$0.66... 10%

Corrugated—

Acme Corrugated Fasteners... 70%

Faucets—

Cork Lined... 50¢10¢100%
 Metallic Key, Leather Lined... 60¢10¢70%
 Red Cedar... 40¢5¢10¢10¢5%
 Petroleum... 70¢10¢10%
 B. & L. B. Co.:
 Metal Key... 60¢10%
 Star... 60%
 West Lock... 50¢10%
 John Sommer's Peerless Tin Key... 40¢10%
 John Sommer's Boss Tin Key... 50%
 John Sommer's Victor Mtl. Key... 50¢10%
 John Sommer's Duplex Metal Key... 60%
 John Sommer's Diamond Lock... 40%
 John Sommer's I.X.L. Cork Lined... 50%
 John Sommer's Reliable Cork Lined... 50%10%
 John Sommer's Chicago Cork Lined... 60%
 John Sommer's O. K. Cork Lined... 50%
 John Sommer's No Brand, Cedar... 50%
 John Sommer's Perfection, Cedar... 40%
 Self Measuring:
 Enterprise, Self Measuring and Pump, # doz., \$36.00... 40¢10%
 Lane's, # doz., \$36.00... 40¢10%
 National Measuring, # doz., \$36.00... 40¢10%

Felloe Plates—

See Plates, Felloe.

Files— Domestic—

List Nov. 1, 1899.

Best Brands... 70¢10¢10%
 Standard Brands... 75¢10¢10%
 Lower Grade... 75¢10¢10%
 Diston's Superfine... 60%
 Gold Medal... 70%
 McCaffrey's American Standard... 60¢10¢10%

Imported—

Stubs' Tapers, Stubs' list, July 24, '97... 3 1/2¢10¢40%

Fixtures, Fire Door—

Richards Mfg. Co.:
 Universal, No. 103; Special, No. 104... 50%
 Fusible Link, No. 36... 50%
 Expansion Bolts, No. 107... 60¢10%

Grindstone—

Net Prices:
 Inch... 15 17 19 21
 Per doz... \$3.60 3.85 4.15 4.65
 Peck, Stow & Wilcox Co.:
 In... 15 17 19 21
 \$1.00 1.40 1.75 5.50 6.50... 30%
 Reading Hardware Co... 60%

Fodder Squeezers—

See Compressors.

Forks—

American Fork & Hoe Co.:
 Iowa Dig-Ezy Potato... 70¢5%
 Hay, Regular, 3-tine... 45¢20¢12%
 Hay, Regular, 4-tine... 60¢7%5%
 Champion, Hay... 60¢12%
 Acme, Hay... 60¢20%
 Manure, Regular, 4-tine... 65¢5%
 Manure, Regular, 5 and 6 tine... 70%
 Champion, Manure... 65¢5%
 Columbia, Manure... 70%
 Acme, 4-tine... 60¢10%
 Round Shoulder Header, 4-tine... 65%
 Champion, Header... 65%
 Dakota, Header... 65%
 Kansas Header... 65%
 Wood, Barley... 35¢5%
 Steel, Barley... 65%
 Columbia, Spading... 70¢7%5%

Frames— Wood Saw—

White, 8'x12' Bar, per doz... 75¢100%
 Red, 8'x12' Bar, per doz... \$1.00¢1.25
 Red, Dbl. Brace, per doz... \$1.40¢1.50

Freezers, Ice Cream—

Qt... 1 2 3 4 6
 Each... \$1.25 \$1.60 \$1.90 \$2.20 \$2.60

Fruit and Jelly Presses—

See Presses, Fruit and Jelly.

Fry Pans—See Pans, Fry.

Fuse— Per 1000 Feet.

Hemp... 2.75
 Cotton... 3.20
 Waterproof Sgl. Taped... 3.65
 Waterproof Dbl. Taped... 4.40
 Waterproof Tpl. Taped... 5.15

Gates, Molasses and Oil—

Stebbins' Pattern... 80¢100%
Gauges—
 Marking, Mortise, &c... 30¢100%
 Chapin-Stephens Co.:
 Marking, Mortise, &c... 50¢50¢10%
 Diston's Marking, Mortise, &c... 60¢10%
 Wire, Brown & Sharpe's... 35%
 Wire, Morse's... 25%
 Wire, P. S. & W. Co... 35%

Gimlets— Single Cut—

Numbered assortments, per gro.

Nail, Metal, No. 1, \$2.00; 2, \$2.50

Spike, Metal, No. 1, \$4.00; 2, \$4.50

Nail, Wood Handled, No. 1, \$2.30; 2, \$2.60

Spike, Wood Handled, No. 1, \$4.30; 2, \$4.60

Glass, American Window

See Trade Report.

Glasses, Level—

Chapin-Stephens Co... 65¢65¢10%
 Diston & Sons... 60¢10%

Glue, Liquid Fish—

Bottles or Cans, with Brush, 25¢10¢50%

Elwell's... 50%

Grease, Axle—

Common Grade... gro. \$6.00¢\$6.50

Dixon's Everlasting, 10-lb. pails, ea. 85¢; in boxes, # doz., 1 lb. \$1.20

Mower Knife and Foot, \$5.00... 40%
 Helmer Hard Oil... 25%

Griddles, Soapstone—

Pike Mfg. Co... 33%10%10%

Grinders—

Pike Mfg. Co.:
 Hand and Foot Power, Pyko Nos. 1, 2, 3; Pyko Primo; Pyko Peerless; Pyko Spiral (foot power)... 35%
 Mower Knife and Foot, \$5.00... 40%
 Royal Mfg. Co.:
 Hand and Foot Power, each, Nos. 01, \$1.75; 1A, \$2.50; 10, \$5.00... 33%
 Sickle Grinders, each, Nos. 20, \$5.00; 20A, \$6.00; 20A Combined, \$6.50... 40%
 Disc Grinders, each, \$2.50... 40%

Grindstones—

Pike Mfg. Co.:
 Improved Family Grindstones, # 1 inch, # doz., \$2.00... 33%
 Richards Mfg. Co., Eli and Cycle, Ball Bearing, mounted... 40%

Grips, Nipple—

Perfect Nipple Grips... 40¢10¢2%

Halters and Ties—

Cow Ties... 70¢10¢10%

Bridgeport Chain Co.:
 Triumph Coil and Halters... 35¢2%40%
 Brown Coil and Halters... 45¢50¢5%
 Brown Cow Ties... 50¢50¢10%
 Brown Tie Outs... 70¢10¢75%
 Covert Mfg. Co.:
 Web... 30¢2%
 Jute Rope... 35%
 Sisal Rope... 20%
 Cotton Rope... 45%
 Hemp Rope... 45%
 Oneida Community:
 Am. Coil and Halters... 40¢40¢5%
 Am. Cow Ties... 45¢50%
 Niagara Coil and Halters... 45¢50¢5%
 Niagara Cow Ties... 45¢50¢10%5%

Hammers—

Handled Hammers—
 Heller's Machinists... 55¢10¢55¢10%5%
 Heller's Farriers... 40¢40¢10%5%
 Peck, Stow & Wilcox Co.:
 Crucible Steel... 40¢10¢50%
 Farriers... 40¢10¢50%
 Rivington... 40¢10¢50%
 Machinists... 60¢65%
 Blacksmiths... 50%
 Elmore Shoemakers' Hammers... 75%
 Fayette R. Plumb:
 A. E. Nail... 40¢2%40¢12%
 Eng. and B. S. Hand... 50¢10%50¢5%
 Machinists' Hammers... 60¢10%5%
 Rivet and Timbers... 40¢7%40¢12%5%
 Victor Magnetic Tack, # gro... 47%5

Heavy Hammers and Sledges—

Under 3 lb., per lb., 50¢... 80¢10%
 3 to 5 lb., per lb., 40¢... 90¢10¢10%
 Over 5 lb., per lb., 30¢... 90%
 Over 5 lb., per lb., 30¢... 80¢10¢10%

Handles—

Agricultural Tool Handles
 Axe, Pick, &c... 60¢10¢10%10%5%
 Hoe, Rake, &c... 40%
 Fork, Shovel, Spade, &c.:
 Long Handles... 40%
 D Handles... 40%

Cross-Cut Saw Handles—

Atkins'... 40%
 Diston's Handles and Saw Yabs... 45%

Mechanics' Tool Handles—

Auger, assorted... gro. \$3.00¢\$3.50
 Brad Axl... gro. \$1.65¢\$1.75
 Chisel Handles, Ass'd, per gro.:
 Tanged Firmer, Apple, \$2.40¢
 \$2.65; Hickory... \$2.15¢2.40
 Socket Firming, Apple, \$1.75¢
 \$1.95; Hickory... 1.60¢1.75
 Socket Framing, Hickory... 1.60¢1.75

File, assorted... gro. \$1.30¢\$1.40

Hammer, Hatchet, &c... 60¢10¢60¢10%5%

Hand Saw, Varntished, doz., 80¢ 85¢; Not Varntished... 65¢75¢

Plane Handles:
 Jack, doz., 30¢; Fore, doz... 45¢
 Chapin-Stephens Co.:
 Carving Tool... 30¢30¢10%
 Chisel... 60¢60¢10%
 File and Awl... 60¢60¢10%
 Saw and Plane... 30¢30¢10%
 Screw Driver... A... 30¢30¢10%
 Millers Falls Adj. and Ratchet Auger... 15¢10%
 Nicholson Simplicity File Handle... # gro. \$0.85¢\$1.50

J. L. Osgood:

Indestructible File and Tool, # gro., No. 1, \$2.00; No. 2, \$2.50; No. 3, \$3.00; No. 4, \$3.50; No. 5, \$4.00... gro. lots 10%

W. A. Zelnicker Supply Co.:

Hammer, # doz., 12 in., \$2.00; 11 in., \$2.00; 16 in., \$2.30; 18 in., \$2.50; 20 in., \$2.70; 22 in., \$3.00; 24 in., \$3.30; 26 in., \$3.50; 30 in., \$3.80

Sledge, # doz., oval, 30 in., \$3.80; octagon, 30 in., \$3.80; oval, 36 in., \$4.00; octagon, 36 in., \$4.00

Axe, # doz., 28 to 34 in., \$5.60; 32 in., \$5.80

Adze, # doz., 36 in., \$5.80; 36 in., \$7.80

Pick, # doz., R. R., 36 in., \$8.00; coal, 34 in., \$5.80

Hatchet, # doz., 12 to 14 in., \$2.00

Hangers—

NOTE.—Barn Door Hangers are generally quoted per pair, without track and Parlor Door Hangers per double set with track, &c.

Chicago Spring Butt Co.:

Friction... 25%
 Oscillating... 25%
 Big Twin... 25%
 Chisholm & Moore Mfg. Co.:
 Baggage Car Door... 50%
 Elevator... 30%
 Railroad... 50%
 Cronk & Carrier Mfg. Co.:
 Loose Axle... 60%10%
 Roller Bearing... 70%
 Griffin Mfg. Co.:
 Solid Axle, No. 10, \$12.00... 60¢10%
 Roller Bearing, No. 11, \$15.00... 60¢10%
 Roller Bearing, Ex. Hy... 60¢10%
 22, \$18.00... 60¢10%
 Bull Dog, \$24.00... 70%
 Lane Bros. Co.:
 Parlor, Ball Bearing, \$1.00:
 Standard, \$3.15; No. 105, \$2.85; New Model, \$2.80. New Champion per set of 4 Hangers, complete with track... \$2.25
 Barn Door, Standard... 60¢10%
 Hinged... net \$6.08
 Covered... 60¢5%
 Special... 70¢5%
 Trolley Hangers and track... 50%
 Cleveland:
 Clipper, No. 75... 60%
 Crown... 55¢10%
 Cyclone, No. 40... net \$6.50
 Tandem, No. 50... net \$7.50
 New York:
 Trolley, No. 30, # pair... \$1.25
 McKinney Mfg. Co.:
 Roller Bearing, Nos. 1 and 2... 70%
 Anti-Friction... 60%
 Hinged Hangers, King Charn... 60%
 Richards Mfg. Co.:
 Hangers, Nos. 47, 48, 147, 247... 70%
 Pioneer Wood Track, No. 3... \$2.25
 Roller B'r'g St'l Track No. 12... \$2.20
 Roller B'r'g St'l Track No. 13... \$2.50
 Roller B'r'g, Nos. 39, 41, 43... 70%7%
 Hero, Adj. Track No. 19... 50¢10%
 Adjustable Track Tandem Trolley Track No. 16... 50¢10%
 Seal, Steel Track No. 8... \$2.25
 And Adj. Track No. 22... 50¢5%
 Trolley B. D. No. 17, \$1.25; F. D. No. 120, \$2.25; No. 121, \$2.45; No. 150... \$2.50
 Safety Underriders F. D. No. 101... 50%
 Tandem No. 41... 2% and 3 60¢10%
 Pair, Adjustable Track No. 132... 50¢5%
 Royal, Adjustable Track No. 122... 50¢10%
 Ives' Wood Track No. 1... \$2.25
 Trolley B. D. No. 20... 50¢10%
 Trolley B. D. No. 24, \$1.30; No. 27, \$1.40; No. 29, \$1.50... \$1.60
 Roller Bearings, Nos. 37, 38, 39, 41, 43, 44, Sizes 1 and 2... 70%7%
 Anti-friction, No. 42; No. 44, sizes 2 1/2 and 3... 60%
 Hinged Tandem No. 48... 60¢5%
 Folding Door B. B. Swivel No. 15... 40%
 Taylor & Boggs F'y Co.'s Kidder's Roller Bearing, # doz. 4 in., \$12.00; 5 in., \$14.00... 40¢10%
 Myers' Stayon Hangers... 60%

Hangers—Garment—

Pullman Trousers, # gro. No. 1, \$9.00; No. 4, \$24.00; No. 5, \$16.50; No. 6, Black Enamel, \$7.50; No. 10, \$21.00; No. 12, \$8.00; No. 15, \$8.00; No. 18, Loops... \$10.00
 Victor Folding... # gro. \$9.60

Gate—

Myers' Patent Gate Hangers, # doz., net... 50%
 Joist and Timber—
 Lane Bros. Co... 35%

Haps—

Griffin's Security Hap... 50¢10%
 McKinney's Perfect Hap, # doz... 60%

Hatchets—

Regular list, first qual... 50¢10¢60%
 Second quality... 60¢60¢10%

Heaters, Carriage—

Clark, No. 5, \$1.25; No. 5B, \$1.50; No. 3, \$1.75; No. 3D, \$2.00; No. 7D, \$2.25; No. 3E, \$2.50; No. 1, \$3.00... 25%
 Clark Coal, # doz., \$0.75... 20%

Hinges—

Blind and Shutter Hinges
 Surface Gravity Locking Blind:
 Doz. Sets with Fastenings, No. 1, \$0.70; No. 3, \$1.25; No. 5, \$1.65.
 Mortise Shutter... 80%
 Mortise Reversible Shutter... 80%
 North's Automatic Blind Fixtures, No. 2, for Wood, \$9.00; No. 3, for Brick, \$1.50... 10%
 Charles Paricle... 70%75%
 Parker Wire Goods Co.
 Hale & Benjamin Automatic Blind Hinges... 30%
 Hale's Blind Awning Hinges, No. 110, for wood, \$9.00; No. 111, for brick, \$9.00... 20%

Reading's Gravity... 60%

Stanley's Steel Gravity Blind Hinges, No. 1647 1/2, # doz, sets, without screws, \$1.25.
 Wrightsville Hardware Co.:
 O. S., Lull & Porter... 75¢5%
 Acme, Lull & Porter... 75%
 Queen City Reversible... 75%
 Shepard's Noiseless, Nos. 60, 65, 55... 75¢5%
 Niagara, Gravity Locking, Nos. 1, 3 & 5... 75¢10%
 Clark's O. P., No. 1... 75¢10%
 Clark's O. P., Nos. 3 and 5... 75¢5%
 Tip Pat'n, No. 1... 75¢10%
 Clark's No. 3... 75¢5%
 Buffalo Gravity Locking, Nos. 1, 3 & 5... 70¢10%5%
 Shepard's Double Locking... 75%
 Champion Gravity Locking... 75¢10%
 Pioneer... 75%
 Empire... 65%
 W. H. Co.'s Mortise Gravity Locking, No. 2... 60¢10%

Gate Hinges—

Clark's or Shepard's—Doz. sets:
 No. 1... 1 2 3
 Hinges with L'chs... \$2.00 2.70 5.00
 Hinges only... 1.25 1.90 3.50
 Latches only... .70 .75 .35

New England:

With Latch... doz. \$2.00
 Without Latch... doz. \$1.60

Reversible Self-Closing:

With Latch... doz. \$1.75
 Without Latch... doz. \$1.35

Western:

With Latch... doz. \$1.75
 Without Latch... doz. \$1.15

Wrightsville Hardware Co.:
 Shepard's or Clark's Hinges and Latches, Hinges only or Latches only, Nos. 1, 2 or 3... 70%

Miscellaneous—

Griffin Mfg. Co., Fleur de Lis Surface Hinges, # doz, prs... \$1.00

Pivot Hinges—

Bommer Bros, Pivot, Ball Bearing... 40%
 Lawson Mfg. Co, Matchless... 30%

Spring Hinges—

Holdback, Cast Iron... \$6.75¢\$7.00
 Non-Holdback, C'st Iron... \$6.50¢\$6.75
 J. Bardsley:
 Bardsley's Non-Checking Mortise Floor Hinges... 40%
 Bardsley's Patent Checking... 35%
 Bommer Bros.:
 Spring Butt Hinges... 40%
 Surface Floor, Ball Bearing... 40%
 Mortise Floor, Ball Bearing... 40%
 Lavatory Hinges... 40%
 Non-Holdback Screen Door, Nos. 2000 and 900... 40%
 Holdback Screen Door, 900... # gro, \$0.00
 Chicago Spring Butt Co.:
 Chicago Spring Hinges... 25%
 Triple End Spring Hinges... 50%
 Chicago (Ball Bearing) Floor... 25%
 Garden City Engine House... 25%
 Keene's Saloon Door... 25%
 Columbian Hardware Co.:
 Acme, Wrought Steel... 30%
 Acme, Brass... 25%
 American... 30%
 Columbia, # gr. No. 11, \$9.00; No. 15... \$12.00
 Columbia, Adj. No. 7, # gr. \$12.00
 Gem, new list... 30%
 Clover Leaf and Acorn, per gro... \$12.00
 Oxford, new list... 30%
 Floor Spring Hinges... 65¢10%
 Columbian Steel... 65¢10%
 Lawson Mfg. Co.:
 Matchless Spring Hinges... 30%
 Matchless Jamb Hinges... 30%
 Richards Mfg. Co.:
 Superior Double Acting Floor Hinges... 40%
 Shelby Spring Hinge Co... 40%
 Buckeye All Steel Holdback Screen Door... # gr. \$9.00
 Chief Ball Bearings Floor Hinge... 50%
 Ball Bearing Door... 25%
 No. 777, Sheet Steel Holdb'r... # gr. pr... \$9.00
 Standard Mfg. Co.:
 Champion Double Acting Door Hinge... 25¢10¢10%
 Standard Double Acting Floor Hinge... 25¢10¢10%
 Superior Spring Hinge Co.:
 Superior Floor Hinges... 40%
 Spring Hinges... 40%

Wrought Iron Hinges—

Strap and T Hinges, &c, list February 10, 1908:
 Light Strap Hinges... 65%
 Heavy Strap Hinges... 75%
 Light T Hinges... 60%
 Heavy T Hinges... 40¢10%
 Extra Hvy. T Hinges... 65¢10%
 Hinge Haps... 40%
 Cor. Heavy Strap... 75%
 Cor. Ex. Heavy T... 65¢10%
 Screw Hook... 6 to 7 1/2 in. 10. 3 1/4¢
 and Strap... 1 1/2 to 2 1/2 in. 10. 3 1/4¢
 2 1/2 to 3 1/2 in. 10. 3 1/4¢
 Screw Hook and Eye:
 3 to 1 inch... 10. 6 1/4¢
 1 1/2 to 2 inch... 10. 7 1/2¢
 1/2 inch... 10. 8 1/2¢

Hitchers, Stall—

Hoes—Eye—
Scovill and Oval Pattern, 60¢ 10¢ 60¢ 10¢ 10¢
Grub, Hat Feb. 23, 1899, 70¢ 10¢ 70¢ 10¢ 10¢
 D. & H. Scovill, 27 1/2%
 Am. Fork & Hoe Co. (Scovill Pat-
 tern) 60¢ 3 1/2%

Handled—
 Cronk's Weeding, No. 1, \$2.00; No. 2, \$2.50
 Star Double Bit, \$2.50
 American Fork & Hoe Co.:
 Regular, Cultivar, 75¢ 10¢ 5 1/2%
 Crescent, Cultivar, 75¢ 2 1/2%
 Mattock, Senior, 70¢
 Mattock, Junior, 70¢
 Sprouting, 50¢
 Tobacco, Harper's, 55¢ 10¢ 15¢ 10¢
 Warren, 55¢ 10¢ 10¢ 5%
 Ivanhoe, 65¢ 15¢ 10¢
 Cultivar, B. B. 6 1/2%
 Cultivar, B. B. 6 1/2%
 Weeding, Acme, 72 1/2% 10¢ 10¢
 Scuffle, Lightning, 60¢ 5%

Hoisting Apparatus—
 See Machines, Hoisting.

Holders—Bit—
 Angular, 1/2 doz., \$21.00, 45¢ 10%
Door—
 Bardley's, Iron, 40%; Brass and
 Bronze, 25%
 Empire, 50%
 Pullman, 25%
 Richards Mfg. Co., No. 117, Ever-
 ready, 40%; No. 118, 119, Sure-
 Grip, 50%
 Superior, 40%

File and Tool—
 Nicholson File Holders and File
 Handles, 33 1/2% 40%

Fruit Jar—
 Triumph Fruit Jar Holder, 1/2 gross,
 \$18.00; 1/2 doz., \$2.00

Trace and Rein—
 Fernald Double Trace Holder, 1/2 doz.,
 pairs, \$1.25
 Dash Rein Holder, 1/2 doz., \$1.25

Hones—Razor—
 Pike Mfg. Co., Belgian and Swat,
 50%; German, 35%

Hooks—Cast Iron—
 Bird Cage, Reading, 40%
 Clothes Line, Reading List, 40%
 Coat and Hat, Reading, 45¢ 20%
 Coat and Hat, Wrightsville, 60¢ 3%
 Harness, Reading List, 40%

Wire—
 Belt, Nos. 1 to 15, 75¢ 10¢ 80%
 Wire O. & H. Hooks, 80¢ 80¢ 10%
 Bradley Metal Clamp Wire, Coat and
 Hat, 75¢ 10¢ 80%; Ceiling, 75¢ 10¢ 80%
 Columbian Hdw. Co., Gem, 75¢ 10%
 Parker Wire Goods Co., King, 75¢ 10%
 Wire Goods Co.:
 Acme, 60¢ 10%; Chief, 70¢ 10%
 Crown, 75%; Czar, 65¢ 10%
 Brace, 35%; Czar Harness, 50%;
 Ceiling, 75%

Wrought Iron—
 Box, 6 in., per doz., \$0.80; 8 in.,
 \$1.15
 Cotton, 10¢ 10¢ 10¢ 10¢ 10¢
 Wrought Staples, Hooks, &c.,
 See Wrought Goods.

Miscellaneous—
 Hooks, Bench, see Stops, Bench.
 Bush, Light, doz., \$5.20; Medium,
 \$6.75; Heavy, \$7.55
 Grass, best, all sizes, per doz.,
 \$2.75 10¢ 30¢
 Grass, common grades, all sizes,
 per doz., \$1.25 10¢ 10¢
 Whiffletree, 10¢ 3 1/2% 4¢
Hooks and Eyes—
 Brass, 60¢ 60¢ 10%
 Malleable Iron, 70¢ 70¢ 10%
 Covert Mfg. Co. Gate and Scuttle
 Hooks, 40%
 Turner & Stanton Co. Cup and
 Shoulder, 85¢ 10%
 Bench Hooks—See Bench Stops.
 Corn Hooks—See Kivres, Corn.

Horse Nails—
 See Nails, Horse.

Horseshoes—
 See Shoes, Horses.

Hose, Rubber—
 Garden Hose, 1/2-inch:
 Competition, 1 ft. 6¢ 6 1/2%
 3-ply Guaranteed, 1 ft. 8 1/2% 6 1/2%
 4-ply Guaranteed, 1 ft. 9 1/2% 12¢
 Cotton Garden, 1/2 in., coupled:
 Low Grade, 1 ft. 8¢ 9¢
 Fair Quality, 1 ft. 10¢ 11¢

Irons—Sad—
 From 4 to 10, 10¢ 2 1/2% 3 1/2%
 B. B. Sad Irons, 10¢ 3 1/2% 3 1/2%
 Mrs. Potts, cents per set:
 Nos. 50 55 60 65
 Jap'd Caps, 35¢ 31¢ 35¢ 33¢
 Tin'd Caps, 91¢ 88¢ 1.01 98¢
 New England Pressing, 10¢ 3 1/2% 4¢
Bar and Corner—
 Richards Mfg. Co., Bar, 60¢ 10%
 Corner, 60%

Pinking—
 Pinking Irons, 10¢ 60¢ 65¢

Irons, Soldering
 See Coppers.

Jacks, Wagons—
 Covert Mfg. Co.:
 Auto Screw, 30¢ 2 1/2%; Steel, 45%
 Lockport, 50%
 Lane's Steel, 30¢ 5%
 Richards' Tiger Steel, No. 139, 50¢ 10%
 Smith & Hemenway Co., 25%

Ladder—
 Richards Mfg. Co., Ladder Jacks, 5%

Jointers—
 Pike Mfg. Co., Saw Jointers, \$7.00, 40%

Kettles—
 Brass, Spun, Plain, 20¢ 25%
 Enamelled and Cast Iron—See Ware,
 Hollow.

Knives—
 Butcher, Kitchen, &c.—
 Foster Bros' Butcher, &c., 30%
 Wilkinson Shear & Cutlery Co., 60%

Corn—
 Columbian Cutlery Co., Wilent,
 Brand Knives and Hooks, 60%
 American Fork & Hoe Co.:
 Easy Cut, 1/2 doz., No. 10 C H, \$2.10
 Easy Cut, 1/2 doz., No. 10 B C H, \$2.20
 Acme, 1/2 doz., \$2.35
 Dent, 1/2 doz., \$2.35
 Adjustable, Serrated, 1/2 doz., \$1.90
 Serrated, 1/2 doz., \$1.85
 Yankee, No. 1 C H, \$1.35
 Yankee, No. 2 C H, \$1.15

Drawing—
 Standard List, 80¢ 10¢ 10%
 C. E. Jennings & Co., Nos. 45, 46,
 25¢ 7 1/2%
 Jennings & Griffin, Nos. 41, 42,
 65¢ 7 1/2%
 Swan's, 65¢ 70%
 Watrous, 16%
 L. & I. J. White, 20¢ 5¢ 25%

Hay and Straw—
 Serrated Edge, per doz., \$5.00 5 1/2%
 Iwan's Sickle Edge, 1/2 doz., \$9.50
 Iwan's Serrated, 1/2 doz., \$10.00

Miscellaneous—
 Farriers', 1/2 doz., \$2.60 3 1/2%
 Wostenholm's, 1/2 doz., \$3.00 3 1/2%

Knobs—
 Base, 2 1/2-inch, Birch or Maple,
 Rubber Tip, 1/2 doz., \$1.25 10¢ 10%
 Carriage, Jap., Drive, all sizes,
 gro., \$5.00 40¢
 Door, Mineral, 1/2 doz., \$5.00 70¢
 Door, Por. Jap'd, 1/2 doz., 70¢ 75¢
 Door, Por. Nickel, 1/2 doz., \$3.05 2 1/2%
 Hardsley's Wood Door, Shutters, &c., 18%

Lacing, Leather—
 See Belting, Leather

Ladders, Store, &c.—
 Lane's Store, 25%
 Myers' Noiseless Store Ladders, 50%
 Richards Mfg. Co.:
 Improved Noiseless, No. 112, 50%
 Climax Shelf, No. 113, 50%
 Trolley, No. 109, 50%

Ladies, Melting—
 L. & G. Mfg. Co., Melting and
 Plumbers', 25%
 P. S. & W., 40¢ 10%
 Reading, 60%

Lamps—
 Hammer's M. I. Hand, 45%

Lanterns—Tubular—
 Regular, No. 0, 1/2 doz., \$3.50 4 1/2%
 Side Light, No. 0, 1/2 doz., \$4.00 4 1/2%
 Hinge Globe, No. 0, 1/2 doz., \$4.00 4 1/2%
 Other Styles, 40¢ 40¢ 10%

Bull's Eye Police—
 3-inch, 1/2 doz., \$3.75 4 1/2%
Latches—Thumb—
 Roggin's Latches, Jap'd, with
 Screws, 1/2 doz., \$5.00 40¢

Door—
 Cronk & Carrier Mfg. Co., No. 101,
 125
 Richards' Bull Dog, Heavy, 50¢ 5%
 Richards' Trump, No. 12, 30%

Leaders, Cattle—
 Small, 1/2 doz., 50¢; large, 60¢
 Covert Mfg. Co.:
 Cotton, 45%; Hemp, 45%; Jute,
 35%; Sisal, 20%

Leathers, Pump—
 See Pumps—

Lifters, Transom—
 R. & E., 10%

Lines—
 Wire Clothes, Nos. 18 19 20
 100 feet, \$2.30 1.95 1.75
 75 feet, \$1.95 1.65 1.50
 Samsen Cordage Works:
 Solid Braided Chalk, Nos. 0 to 3, 40%
 Solid Braided Masons', 30%
 Silver Lake Braided Chalk, No. 0,
 \$6.00; No. 1, \$6.50; No. 2, \$7.00; No.
 3, \$7.50, 1/2 gr. 20%
 Masons' Lines, Shade Cord, &c.,
 White Cotton, No. 3 1/2, \$1.50; No. 4,
 \$2.00; No. 4 1/2, \$2.50; Colors, No. 3 1/2,
 \$1.75; No. 4, \$2.25; No. 4 1/2, \$2.75;
 Linen, No. 3 1/2, \$2.50; No. 4, \$3.50;
 No. 4 1/2, \$4.50, 20%
 Tent and Awning Lines; No. 5,
 White Cotton, \$7.50; Drab Cotton,
 \$8.50, 20%
 Clothes Lines, White Cotton; 50 ft.,
 \$7.00; 60 ft., \$7.25; 70 ft., \$7.75;
 80 ft., \$8.00; 90 ft., \$8.25;
 100 ft., \$8.50, 20%
 Turner & Stanton Co.:
 Solid Braided Chalk, Masons' and
 Awning Lines, 40%
 Clothes Lines, White Cotton, 20%
 Shade Cord, Cotton or Linen, 20%

Locks—Cabinet—
 Cabinet Locks, 33 1/2% 33 1/2% 3%
Door Locks, Latches, &c.—
 NOTE—Net Prices are very often made
 on these goods.
 Reading Hardware Co., 40%
 R. & E. Mfg. Co., 15%

Padlocks—
 R. & E. Mfg. Co., Wrought Steel and
 Brass, 75¢ 15%

Sash, &c.—
 Ives' Patent:
 Crescent, 10%
 Automatic Gravity Metal Sash, 10%
 gro., \$18.50, 10%
 Window Ventilating, 10%
 Pullman Patent Ventilating Lock, 25%
 Reading Sash Locks, 40%
 Taylor Mfg. Co., Perfect Ventilating,
 1/2 doz., \$0.75 40¢ 10%

Machines—Boring—
 Com. Up'r't, without Augers,
 \$2.00 2 1/2%
 Com. Ang'l'r, without Augers,
 \$2.25 2 1/2%
 Ford Auger Bit Co., \$2.25 2 1/2%
 Jennings', Nos. 1 and 4, 25¢ 7 1/2%
 Millers' Falls, 5 1/2%
 Snell's, Upright, \$2.65; Angular, \$2.90
 Swan's Improved, 10¢ 10%

Corking—
 Reisinger Invinible Hand Power, 1/2
 doz., \$18.00

Fence—
 Williams' Fence Machines, each, \$5.50

Hoisting—
 Moore's Anti-Friction Chain Hoist, 30%
 Brake, 20%
 Moore's Cyclone High Speed Chain
 Hoist, 25%

Ice Cutting—
 Chandler's, 12 1/2%

Washing
 Boss Washing Machine Co.: Per doz.
 Boss No. 1, \$57.00
 Boss Rotary, \$57.00
 Champion Rotary Banner No. 1, \$57.00
 Standard Champion No. 1, \$50.00
 Standard Perfection, \$27.99
 Cincinnati Square Western, \$35.00
 Uneda American, Round, \$33.60

Mallets—
 Hickory, 45¢ 45¢ 50%
 Lignumvite, 45¢ 45¢ 50%
 Tinnars' Hickory and Apple-
 wood, 45¢ 45¢ 50%

Mangers, Stable—
 Sweet Iron Works, 50%

Mats, Door—
 Acme Flexible Steel, 50%
 Elastic Steel (W. I. C.), new list, 50%
 Everlasting Flexible Steel, 33 1/2%

Mattocks—
 See Picks and Mattocks.

Milk Cans—See Cans, Milk.

Mills, Coffee, &c.—
 Enterprise Mfg. Co.:
 Coffee, 20¢ 25%
 Seal and Corn, 25¢ 10%
 National list Jan. 1, 1902, 30%
 Parker's Columbia and Victoria, 33 1/2%
 Parker's Box and Side, 50¢ 10%
 Swift, Lane Bros. Co., 30%

Motors, Water—
 Divine's Red Devil, 30%
 \$2.50 3.50 10.00 15.00, 33 1/2%
 No. 1, 2, 3, 4
 Lippincott's: 1 2 3 4
 No., \$2.50 3.50 10.00 15.00, 33 1/2%
 Pike Mfg. Co., Tool and Knife,
 Grinding, 33 1/2%

Mowers, Lawn—
 NOTE—Net prices are generally quoted
 Cheapest, 10-in., \$2.00; advance
 10¢ for each size.
 Cheap, 10-in., \$2.25; advance 15¢
 20¢ for each size.
 Better Grade, 10-in., \$3.00; ad-
 vance 25¢ for each size.
 12 14 16 18 in.
 High Grade, \$4.50 4.75 5.00 5.25
 Continental, 60%
 Great American, 70%
 Great American Ball B'g, new list, 70%
 Quaker City, 70%
 Pennsylvania, 60%
 Pennsylvania, Jr., Ball Bearing,
 50¢ 10¢ 5%
 Pennsylvania Golf, 50%
 Pennsylvania Horse, 33 1/2% 5%
 Pennsylvania Pony, 40¢ 5%

Nails—
 Wire Nails and Brads, Miscel-
 laneous, 85¢ 85¢ 10%
 Cut and Wire, See Trade Report.
 Hungarian, Finishing, Upholster-
 ers', &c., See Tacks.

Horse—
 Nos. 6 7 8 9 10
 Anchor, 23 21 20 19 18, 1/2 lb.,
 net, 12¢
 Coleman, 13 12 12 11 11, net 1/2 lb.
 New Haven, 23 21 20 19 18, 1/2 lb.,
 net, 12¢
 Livingston, 19 18 17 16 16, 10%
 Western, 1/2 lb. 8 1/2%
 Jobbers' Special Brands, per lb. 9¢

Picture—
 1 1/2 2 2 1/2 3 in.
 Brass Hd. gro., 45¢ 55¢ 60¢ 70¢
 Por. Head, gro., 1.10 1.10 1.10

Upholsters—
 Brass, 30%
 Plated, 30¢ 10%

Nippers—
 See Pliers and Nippers.

Nipples—
 Standard Nipple Co.:
 Wrought Pipe Nipples, 80%

Nuts—Blank or Tapped.

Cold Punched: Off list.
 Square, 5.00¢
 Hexagon, 6.00¢
 Square, C. T. & R., 5.40¢
 Hexagon, C. T. & R., 6.40¢

Hot Pressed: Off list.
 Square, 5.90¢
 Hexagon, 6.40¢

Oakum—
 Best, 10¢ 6 1/2%
 U. S. Navy, 10¢ 6¢
 Navy, 10¢ 5¢
 Plumbers' Spun Oakum, 25¢ 4 1/2%

Oil—
 Pike Mfg. Co., Stonoil, 40%

Oil Tanks—See Tanks, Oil.

Oilers—
 Steel, Copper Plated, 75¢ 10%
 Chase or Paragon:
 Brass and Copper, 50¢ 10%
 Zinc, 65¢ 10¢ 70%
 Railroad, 60¢ 10¢ 10%
 American Tube & Stamping Co.:
 Spring Bottom Cans, 70¢ 70¢ 10%
 Railroad Oilers, &c., 60¢ 60¢ 10%
 Hero Fruit Jar Co.:
 Spring Bottom Cans, 70¢ 70¢ 10%
 Railroad Oilers, etc., 60¢ 60¢ 10%
 Malleable, Hammers, Improved, Nos.
 11, 12 and 13, 10%; Old Pattern,
 Nos. 1, 2, 3, 4, 50%
 Maple City Mfg. Co.:
 Spring Bottom Cans, 70¢ 70¢ 10%
 Railroad Oilers, &c., 60¢ 60¢ 10%

Openers—Packing Box—
 Hercules, 1/2 doz., 5 1/2%, 30%

Can Openers—Per doz.
 Sprague, Iron Handle, 30¢ 35¢
 Sprague, Wood Handle, 40¢
 Sordine Sissors, 11.75 3.00
 Can and Bottle Openers, 1/2 doz.,
 net: Yankee, \$0.75 80¢ 85¢; Little
 Gem, \$0.50 80¢ 85¢; Nifty, \$0.75

Egg—
 Hartigan Nickel Plate, 1/2 doz., \$2.00;
 Silver Plate, \$1.00

Packing—
 Asbestos Packing, Wick and
 Rope, any quantity, 46¢ 17¢

Rubber—
 (Fair quality goods.)
 Sheet, C. I., 11¢ 12¢
 Sheet, C. O. S., 11¢ 12¢
 Sheet, C. B. S., 12¢ 13¢
 Sheet, Pure Gum, 40¢ 45¢
 Sheet, Red, 40¢ 45¢
 Jenkins' 96, 1/2 lb., 80¢ 25%

Miscellaneous—
 American Packing, 10¢ 7 1/2%
 Cotton Packing, 10¢ 10¢ 25¢
 Italian Packing, 10¢ 9 1/2%
 Jute, 40¢ 4 1/2%
 Russia Packing, 10¢ 9 1/2%

Pails, Water, Well, &c.—
 See Buckets.

Paint—
 Dixon's Silica-Graphite, in 1 gal.
 pails and 5 gal. kegs, 25%; pack-
 ages of larger size, 20%

Pans—Dripping—
 Standard List, 75¢ 5¢ 75¢ 10%
 Edwards, Royal Blue, 75%

Fry—
 Common Lipped:
 Nos. 1 2 3 4 5
 Per doz., \$0.75 0.85 0.95 1.15 1.30

Refrigerator, Galva.—
 12 14 16 18
 Per doz., \$1.75 2.25 2.80 3.15

Paper—Building Paper
 Asbestos, 10¢
 Roll Board or Building Felt,
 6 to 30 lb., per 100 sq. ft., 2 1/2%
 Roll Board or Building Felt,
 3-32 and 1/2 in., 45 to 60 lb.,
 per 100 sq. ft., 3 1/2%
 Mill Board, Sheet, 40 x 40 in.,
 1-32 to 1/2 in., 3 1/2%
 Per roll.
 Rosin Sized Sheathing: 500 sq. ft.
 Light weight, 25 lbs. to roll, 48¢ 58¢
 Medium weight, 30 lbs. to roll, 58¢ 70¢
 Heavy weight, 40 lbs. to roll, 75¢ 78¢
 Black Water Proof Sheathing,
 500 sq. ft., 1 ply, 65¢; 2 ply,
 85¢; 3 ply, \$1.10; 4 ply, \$1.25.
 Deafening Felt, 9, 6 and 4 1/2 sq.
 ft. to lb., ton, \$54.50
 Red Rope Roofing, 250 sq. ft.
 per roll, \$1.75

Tarred Paper—
 1 ply (roll 400 sq. ft.), ton,
 \$31.00 33.00
 2 ply, roll 108 sq. ft., 65¢
 3 ply, roll 108 sq. ft., 88¢
 Slater's Felt (roll 500 sq. ft.), 80¢

Sand Paper and Cloth—
 Flint and Emery, 50¢ 10%
 Garnet Paper and Cloth, 85%

Papers—Apple—
 Goodell Co.:
 Family Bay State, 1/2 doz., \$15.00
 Improved Bay State, 1/2 doz., \$38.00
 New Lightning, 1/2 doz., \$7.90
 Turn Table, 1/2 doz., \$6.00
 White Mountain, 1/2 doz., \$5.00
 Bonanza Improved, each \$7.50
 Dandy, each \$10.00
 Eureka Improved, each \$20.00
 New Century, each \$20.00
 Ranger, each \$30.00

Sausage Stuffers or FillersSee *Stuffers or Fillers, Sausage.***Saw Frames—**See *Frames, Saw.***Saw Sets—See Sets, Saw.****Saw Tools—See Tools, Saw.****Saws—**

Atkins':	45%
Circular	50¢ to 50¢
Band	50¢ to 50¢
Butcher Saws	35%
Cross Cuts	40%
One-Man Cross Cut	40%
Narrow Cross Cut	50%
Hand, Rip and Panel	35¢ to 35¢
Miter Box and Compass	40%
Mulay, Mill and Drag	45%
Wood Saws	40¢ to 10%
Chapin-Stephens Co.:	
Turning Saws and Frames	30¢ to 30¢ to 10%
Diamond Saw & Stamping Works:	
Sterling Kitchen Saws	30¢ to 10¢ to 10%
Disston's:	
Circular, Solid and Ins'ted Tooth	50%
Band, 2 to 18 in. wide	60%
Band, 3 to 13	60%
Crosscuts	45%
Narrow Crosscuts	50%
Mulay, Mill and Drag	40%
Framed Woodsaws	25%
Woodsaw Rods, Tinned	15%
Hand Saws, Nos. 12, 9, 9, 16, d100	25%
D8, 120, 76, 77, 8	25%
Hand Saws, Nos. 7, 107, 107, 3, 1	30%
Compass, Key Hole, &c.	45%
Hand Ice Saws	45%
Butcher Saws and Blades	30%
C. E. Jennings & Co.'s:	
Back Saws	16%
Butcher Saws	25¢ to 7½¢
Compass and Key Hole Saws	33½¢ to 7½¢
Framed Wood Saws	25%
Hand Saws	12%
Wood Saw Blades	33½¢ to 7½¢
Millers Falls:	
Butcher Saws	15¢ to 10%
Star Saw Blades	15¢ to 10%
Massachusetts Saw Works:	
Victor Kitchen Saws	40¢ to 10¢ to 50%
Butcher Saws and Blades	35¢ to 40%
Peace & Richardson's Hand Saws	30%
Simonds':	
Circular Saws	45%
Cruciform Ground Cross Cut Saws	30%
One-Man Cross Cuts	40%
Gang Mill, Mulay and Drag Saws	40%
Back Saws	25¢ to 5¢ to 7½¢
Butcher Saws	35¢ to 25¢ to 7½¢
Hand Saws	25¢ to 25¢ to 7½¢
Hand Saws, Bay State Brand	45%
Compass, Key Hole, &c.	25¢ to 7½¢
Wood Saws	40¢ to 7½¢
Wheeler, Madden & Clemson Mfg. Co.'s Cross Cut Saws	50%

Hack Saw Blades and Frames—

Atkins' Hack Saw Blades A A A	25%
Disston's:	
Concave Blades	25%
Chromol Blades	35%
Hack Saw Frames	30%
Simonds, 25%; The Best, 35%	35%
Culley	35%
C. E. Jennings & Co.:	
Hack Saw Frames, Nos. 175, 180	40¢ to 7½¢
Hack Saws, Nos. 175, 180, complete	40¢ to 7½¢
Goodell's Hack Saw Blades	40¢ to 10%
Griffin's Hack Saw Frames	35¢ to 10%
Griffin's Hack Saw Blades	35¢ to 10%
Star Hack Saws and Blades	15¢ to 10%
Sterling Hack Saw Blades	30¢ to 10¢ to 5%
Sterling Hack Saw Frames	30¢ to 10¢ to 10%
Sterling Power Hack Saw Machines, each, No. 1, \$25.00; No. 2, \$30.00	10%
Victor Hack Saw Blades	25%
Victor Hack Saw Frames	40%
Whitaker Mfg. Co.:	
National Hand Blades, Hand Frames, Power Blades	40%
Scroll—	
Barnes, No. 1, \$15.	25%
Barnes' Scroll Saw Blades	40%
Barnes' Velocipede Power Scroll Saw, without boring attachment, \$18; with boring attachment, \$20	20%
Leiter, complete, \$10.00	15¢ to 10%
Rogers, complete, \$3.50 and \$4.00	15¢ to 10%

Scales—

Union Platform, Plain	\$2.10 to \$2.20
Union Platform, Stgd.	\$2.20 to \$2.30
Chatillon's:	
Eureka	25%
Favorite	40%
Grocers' Trip Scales	50%
The Standard Portables	40%
The Standard H. R. and Wag-	

Scrapers—

Box, 1 Handle	doz. \$1.55 to \$1.50
Box, 2 Handle	doz. \$2.35 to \$2.50
Ship, Light, \$2.00; Heavy, \$1.50	
Chapin-Stephens Co., Box, 30¢ to 10¢	
Richards Mfg. Co., Foot	60%

Screws—Bench and Hand

Bench, Iron, doz., 1 in.	\$2.50 to 2.75; 1½, \$3.00 to 3.25; 1¼, \$3.50 to 3.75
Bench, Wood	80¢ to 10¢ to 10%
Hand, Wood	70¢ to 10¢ to 10¢ to 10%
Chapin-Stephens Co., Hand	70¢ to 10¢ to 2½%
Coach, Lag and Hand Rail-Lag, Cone Point	80¢ to 10%
Coach, Gimlet Point	80¢ to 10%
Hand Roll	70¢ to 10¢ to 75%
Jack Screws—	
Standard List	70¢ to 10¢ to 75%
Millers Falls	50¢ to 10¢ to 10%
Sweet Iron Works	70¢ to 75%

Machine—

Cut Tread, Iron, Brass or Bronze:

Flat Head or Round Head,

50¢ to 50¢ to 10%

Fillister Head, 40¢ to 10¢ to 10%

Rolled Thread, F. H. or R. H.,

Iron, 75¢ to 10%

F. H. or R. H., Brass, 65¢ to 10%

8 to 14.

Set and Can—

Set (Iron), 75¢ to 10¢ to 7½%

Set (Steel), net advance over

Iron, 25%

Sq. Hd. Cap, 70¢ to 10¢ to 7½%

Hex. Hd. Cap, 70¢ to 10¢ to 7½%

Rd. Hd. Cap, 50¢ to 7½%

Fillister Hd. Cap, 60¢ to 7½%

Wood—

List July 23, 1903.

Flat Head, Iron, 87½¢ to 50¢

Round Head, Iron, 85¢ to 50¢

Flat Head, Brass, 80¢ to 50¢

Round Head, Brass, 77½¢ to 50¢

Flat Head, Bronze, 75¢ to 50¢

Round Head, Bronze, 72½¢ to 50¢

Drive Screws, 87½¢ to 50¢

Scroll Saws—

See *Saws, Scroll.*

Scythes—

Per doz.

Plain Grass, Cutting Edge Pol-

ished, \$6.25 to \$6.50

Clipper, Bronzed Web, \$6.50 to \$6.75

Solid Steel, Web and Backs Pol-

ished, \$7.00 to \$7.25

Bush, Weed and Bramble,

Painted, \$6.50 to \$6.75

Grain, Painted, Cutting Edge

Polished, \$8.25 to \$8.50

Clipper Grain, Bronze Web,

\$8.50 to \$8.75

Seeders, Raisin—

Enterprise, 25 to 30%

Sets—Awl and Tool—

Fray's Tool Handles, Nos. 1, \$12;

\$16; 3, \$15

Miller's Falls Adj. Tool Handles, No.

1, \$12; No. 4, \$12; No. 5, \$18; 20 to 10%

Garden Tool Sets—

American Fork & Hoe Co.:

Rake, Shovel and Hoe, ½ doz, sets,

No. 3 P F, \$7.25

Sets, Nail—

Octagon, 30 to 35 to \$3.50 to \$3.75

Buck Bros, 25%

Elmore Tool Mfg. Co., 30%

Mayhew's, ½ doz, \$9.00

Snell's Corrugated, Cup Pt., 40 to 10%

Snell's Knurled, Cup Pt., 40 to 10%

Victor Knurled, Cup Pt., ½ doz, \$7.50

Rivet—

Regular Hat, 75 to 75 to 10%

Saw—

Atkins':

Criterion, 40%

Adjustable, 40%

Disston's Star Monarch and Tri-

umph, 30%

Giant Royal Cross Cut, ½ doz, \$7.50

Morrill's No. 1, \$15.00

Nos. 3 and 4, Cross Cut, \$20.00

No. 5, Mill, \$30.00

No. 10, 11, \$6.00

No. 1 Old Style, \$10.00

Special, \$16.25

Royal, Hand, ½ doz, \$4.50

Seymour Smith & Son's, 65%

Taintor Positive, ½ doz, \$6.75

Shaving—

Fox Shaving Shave, No. 30,

½ doz, net, \$24.00

Smith & Hemenway Co.'s, 75%

Sharpeners, Knife—

Pike Mfg. Co.:

Fast Cut Pocket Knife Hones,

½ doz, \$1.50

Mounted Kitchen Sand Stone,

½ doz, \$1.50

Natural Grit Carving Knife

Hones, ½ doz, \$2.00

Quick Cut Emery Carving

Knife Hones, ½ doz, \$1.50

Quick Edge Pocket Knife

Hones, ½ doz, \$2.50

Skate—

Smith & Hemenway Co., Eureka, 50%

Shaves, Spoke—

Iron, doz. \$1.25

Wood, doz. \$2.00

Chapin-Stephens Co., 30¢ to 10¢ to 10%

Goodell's, ½ doz, \$3.00, 15¢ to 10%

Seymour Smith & Son's, 60%

Shears—

Cast Iron, 7 8 9 in.

Best, \$16.00 18.00 20.00 gro.

Good, \$13.00 15.00 17.00 gro.

Cheap, \$5.00 6.00 7.00 gro.

Straight Trimmers, doz.

Best Quality Jap., 70¢ to 65%

Best Quality Nickel, 60¢ to 65%

Tailors' Shears, 40¢ to 10¢ to 10%

Acme Cast Shears, 40¢ to 65%

Columbian Cutlery Co.,

Sheep, 1900 list, 30¢ to 10¢ to 5%

Grass, 50¢ to 10%

Horse or Mule, 50¢ to 10%

W. H. Compton Shear Co.:

Japan Handles, Nickel Blades,

60¢ to 10¢ to 5%

Full Nickel, 20¢ to 10¢ to 5%

Heinisch's Tailor's Shears, 10%

National Cutlery Co.'s Nickel Plated,

60¢ to 10%; Japan Handles, 70¢ to 10%

J. W. S. & Sons Co.:

Best Quality Jap'd, 80¢ to 10%

Best Quality Nickle'd, 50¢ to 10%

Tailors', 25%

Tinners' Snips

Steel Blades, 20¢ to 60¢ to 10%

Steel Lad Blades, 80¢ to 10%

Acme Cast Snips, 40¢ to 15¢ to 5%

W. H. Compton Shear Co. Forged

Steel Handles, 50¢ to 45%

Forged Handles, Steel Blades, Ber-

lin

Heinisch's Snips, 40%

Jennings & Griffin Mfg. Co.'s 6½ to

10 in., 33½¢ to 7½%

National Cutlery Co.'s Forged Steel, 60%

Niagara Snips, 40%

P. S. & W. Forged Handles, 25%

W. R. & Sons Co., 50%

J. W. S. & Sons Co., 25%

Wiss Forged Steel, 25%

Pruning Shears—

Columbian Cutlery Co.:

Hedge, Wilcut Brand, 60¢ to 10%

Lawn and Border, Wilcut Brand,

60¢ to 10%

W. H. Compton Shear Co., Dropped

Forged Steel, 35%

Cronk's Hand Shears, 33½%

Cronk's Wood Handle Shears, 33½%

Disston's Combined Pruning Hook

and Saw, ½ doz, \$18.00, 25%

Disston's Pruning Hook only, 25%

doz., \$12.00, 25%

J. T. Henry Mfg. Co.:

Pruning Shears, all grades, 40%

P. S. & W. Co., 40¢ to 10%

Seymour Smith & Son's:

Hand Shears, 70%

Standard Tree Pruners, 75¢ to 10%

Wood Handle Pruning Shears, 40%

Sheaves—Sliding Door—

Reading, 40%

R. & E. list, 15%

Sliding Shutter—

Reading list, 40%

R. & E. list, 15%

Shells—Shells, Empty—

Brass Shells, Empty:

Climax, 10 and 12 gauge, 60¢ to 5%

Climax, 16 and 20 gauge, 60¢ to 5%

Climax, 60¢ to 5%; First Quality,

60¢ to 5%

Paper Shells, Empty:

New Rapid, 10, 12, 16 and 20 gauge,

25¢ to 10%

Climax, 10 and 12 gauge; Acme and

Magic, 10, 12, 16 and 20 gauge;

Ideal, 10, 12, 16 and 20 gauge;

Leader grade, 25¢ to 5%

Union, League, 10 and 12 gauge,

Rival Grade, 25%

New Climax, Defiance, 10, 12, 16

and 20 gauge; Climax, 14, 16

and 20 gauge, 20%

Challenge, Monarch, 10, 12, 16 and

20 gauge; League, Union, 14, 16

and 20 gauge; Repeater Grade, 20%

Shells, Loaded—

Loaded with Black Powder, 40%

Loaded with Smokeless Powder,

medium grade, 40¢ to 5%

Loaded with Smokeless Powder,

high grade, 40¢ to 10¢ to 10%

Union Metallic Cartridge Co.:

New Club, Black Powders, 40%

Nitro Club, Smokeless Powders, 40¢ to 5%

Arrow, Smokeless Powders, 40¢ to 10%

Winchester:

Smokeless Repeater Grade, 40¢ to 5%

Smokeless Leader Grade, 40¢ to 10%

Black Powder, 40%

Shingles, Metal—Per Sq.

Edwards Mfg. Co.:

Painted, Galv.

11 x 20, \$1.25 \$6.00

10 x 20, 4.50 6.25

7 x 10, 4.75 6.50

Wheeling Corrugating Co.:

Dixie, 14 x 20 in., \$4.95

Dixie

Scythe Stones—

Pike Mfg. Co., 1907 list:	
Black Diamond S. S. gro.	\$12.00
Lamolle S. S. gro.	\$11.00
White Mountain S. S. gro.	\$9.50
Green Mountain S. S. gro.	\$7.00
Extra Indian Pond S. S. gro.	\$8.00
No. 1 Indian Pond S. S. gro.	\$7.50
No. 2 Indian Pond S. S. gro.	\$5.00
Leader Red End S. S. gro.	\$6.00
Quick Cut Emery gro.	\$10.00
Pure Corundum gro.	\$18.00
Crescent gro.	\$7.00
Emery Scythe Rifles, 2 Coat.	\$8.80
Emery Scythe Rifles, 3 Coat.	\$11.00
Emery Scythe Rifles, 4 Coat.	\$13.20
Balance of 1907 list 33 1/2%	
Lectro (Artificial) gro.	\$12.00, 33 1/2%
\$12.00	33 1/2%
Lightning (Artificial) gro.	\$18.00, 33 1/2%

Stoppers, Bottle—

Victor Bottle Stoppers gro. \$9.00

Stops—Bench—

Miller Falls, 15x10%	
Morrill's, No. 1, 10x00	50%
Morrill's, No. 2, 12x50	50%
Seymour Smith & Son's	60%

Door—

Chapin-Stevens Co. 50x50x10%

Plane—

Chapin-Stevens Co. 20%

Straps—Box—

Acme Embossed, case lots. 20x10x10%

Carr's Universal, case lots. 20x10x10%

Stretchers, Carpet—

Cost Iron, Steel Points, doz. 55¢

All Steel Socket, doz. \$2.00@2.25

Excelior Stretcher and Tack Hammer Combined, doz. \$6.00...20%

Stuffers, Sausage—

Enterprise Mfg. Co., Stuffers and

Lard Presses...25x25x7 1/2%

National Specialty Co., list Jan. 1,

1902...30x5%

P. S. & W. Co. 10x10x5%

Sweepers, Carpet—

Goshen Sweeper Co., Per doz.

Gilt Edge...\$27.00

Superfine...26.00

Majestic...24.00

Select, Nickel...22.00

National Sweeper Co.

National Queen, Nickel...\$27.00

Martha Washington, Nickel...25.00

Monarch, Japaned...20.00

Perpetual, Japaned...18.00

Streator Metal Stamping Co.

Model E, Sanitaire...\$25.00

Eureka...15.00

Streator Majestic, Nickel...21.00

Streator Conqueror, Japaned...22.00

NOTE—Leading Manufacturers give

the following rates from list prices: 50¢

per dozen on five-dozen lots; \$2 per dozen on

ten dozen lots.

Tacks, Finishing Nails,**&c.**

American Carpet Tacks. 90x25x—

American Cut Tacks. 90x25x—

Succede's Cut Tacks. L. 90x30x—

Succede's Upholsterers'. 90x35x—

Gimp Tacks. 90x35x—

Lace Tacks. 90x35x—

Trimmers' Tacks. 90x30x—

Looking Glass Tacks. 65x—

Bill Posters and Railroad Tacks,

90x10x—

Hungarian Nails. 80x—

Finishing Nails. 70x—

Trunk and Clout Nails. 75x50x—

NOTE—The above prices are for

Straight Weights.

Miscellaneous—

Double Pointed Tacks, 90x4 tens@—%

Tanks, Oil and Gasoline—

Wilson & Friend Co.:

Gal. Gasoline Oil

30 \$2.75 \$3.90

60 \$3.50 \$4.00

110 \$5.00 \$5.75

Tapes, Measuring—

American Asses' Skin. 50x—%

Patent Leather. 35x30x5%

Steel 33 1/2x45%

Chesterman's 25x35x5%

Keuffel & Esser Co.:

Favorite, Ass Skin. 40x10x50%

Favorite, Duck and Leather. 25x25x10%

Metallic and Steel, lower list, 35x

35x5%; Pocket, 35x35x5%.

Lufkins:

Asses' Skin. 40x10x50%

Metallic 30x30x5%

Patent Bend, Leather. 25x25x10%

Pocket 40x40x5%

Steel 33 1/2x45%

Wichman & Hiler:

Chesterman's Metallic, No. 34L,

etc. 25%

Chesterman's Steel, No. 103L,

etc. 35%

Teeth, Harrow—

Steel Harrow Teeth, plain or

headed, 3/4-inch and larger

per 100 lb. \$2.55 @ \$2.80

Thermometers—

Tin Case, Cabinet, Plange,

Dairy, &c. 30x35%

Ties, Bale—Steel Wire—

Single Loop. 32 1/2x10%

Monitor, Cross Head, &c. 70x2 1/2%

Tinners' Shears, &c.—

See Shears, Tinners', &c.

Tinware—

Stamped, Japaned and Piced, sold

very generally at net prices.

Tire Benders, Upsetters, &c.

See Benders and Upsetters, Tire.

Tools—Coopers'—

L. & I. J. White. 20x20x5%

Haying—

Myers' Hay Tools. 50%

Ice Tools—

Gifford-Wood Co. 15%

Miniature—

Smith & Hemenway Co.'s, David-

son, doz., Nickel Plated, \$1.50;

Gold Plated. \$2.00

Saw—

Atkins' Cross Cut Saw Tools. 35x5%

Simond's Improved. 30%

Simond's Crescent. 30%

Ship—

L. & I. J. White. 25%

Torches—

Hammers, Engine, doz. \$4.50

Transom Lifters—

See Lifters, Transom.

Traps—Fly—

Balloons, Globe or Acme, doz.,

\$1.15@1.25; gro. \$11.50@12.00

Harper, Champion or Paragon,

doz., \$1.25@1.40; gro. \$13.00@13.50

Game—

Imitation Onocida. 75x10%

Newhouse. 50x5%

Hawley & Norton. 65x10%

Victor. 75x10x10%

Onocida Community Jump. 70x5%

Stop Thief. 60%

Tree Trap. 60%

Hector. 75x10x10%

Mouse and Rat—

Mouse, Wood, Choker, doz. holes,

12¢

Mouse, Round or Square Wire,

doz. \$5.50@6.00

Marty French Rat and Mouse Traps

(Genuine), doz.:

Crate lots. Small lots.

No. 1, Rat. \$11.50 \$14.50

No. 3, Rat. \$5.75 \$6.50

No. 3 1/2, Rat. \$4.70 \$5.25

No. 5, Mouse. \$2.25 \$3.00

Animal Trap Co.:

Out o' Sight, Mouse, doz. \$0.60

Out o' Sight, Rat, doz. 1.20

Easy Set, Mouse, doz. .33

Easy Set, Rat, doz. .85

Out o' Sight Chockers, doz.

holes. 12

Out o' Sight, Tin, 5-hole, doz.

traps. 75

Trowels—

Disston Brick and Pointing. 25%

Disston Plastering. 20%

Disston "Standard Brand" and Gar-

den Trowels. 30%

Kohler's Steel Garden Trowels, gro.

5 in., \$1.80; 6 in., \$2.00

Never-Break, Forged Steel Garden

Trowels, in bulk, net gro. \$5.50

In 1 doz. boxes. gro. \$6.00

Woodrough & McParlin, Plastering. 25%

Trucks, Warehouse, &c.—

B. & L. Block Co.:

New York Pattern. 50x10%

Western Pattern. 60x10%

Handy Trucks. doz. \$16.00

Grocery doz. \$15.00

McKinney Trucks. each, net \$10.00

Model Store Trucks. doz. \$18.50

Tubs, Wash—

M'fgr's list, price per gross.

No. 0 1 2 3

Galvanized. \$67 \$79 \$91 \$103 10x7 1/2

45x5%

Twine, Miscellaneous—

Flax Twine:

No. 9, 1/4 and 1/2 lb. Balls. 21x23¢

No. 12, 1/4 and 1/2 lb. Balls. 19x21¢

No. 18, 1/4 and 1/2 lb. Balls. 16x18¢

No. 24, 1/4 and 1/2 lb. Balls. 15x17¢

No. 36, 1/4 and 1/2 lb. Balls. 15x17¢

Chalk Line, Cotton 1 1/2 lb. Balls

21x23¢

Cotton Mops, 6, 9, 12 and 15 lb.

to doz. 8 1/2x10¢

Cotton Wrapping, 5 Balls to lb.

according to quality. 12 1/2x14¢

American 2-Ply Hemp, 1/4 and

1/2 lb. Balls. 10 1/2x14¢

American 3-Ply Hemp, 1-lb. Balls

15 1/2x16¢

India 2-Ply Hemp, 1/4 lb. Balls

Balls (Spring Twine). 7 1/2x9¢

India 3-Ply Hemp, 1-lb. Balls

7 1/2x9¢

2, 3, 4 and 5-Ply Jute, 1 1/2 lb. Balls

5x11¢

Mason Line, Linen, 1/4 lb. Balls. 17¢

No. 26 1/2 Mattress, 1/4 and 1/2 lb.

Balls, according to quality.

30x60¢

Wool, 5 to 6 ply. B 6¢; A 7 1/2¢

Vases—

Solid Box. 60x60x10%

Parallel—

Athol Machine Co.:

Simpson's Adjustable. 40%

Standard. 40%

Amateur. 25%

Columbian. 40%

Slide. 5%

Fisher & Norris Double Screw, each.

Nos. 2, \$10.00; 3, \$16.00; 4, \$20.50

5, \$27.00; 6, \$32.00. 15x10%

Fisher-Brooks Bench Vices, No. 0,

\$3.50; No. 1, \$5.00; No. 2, \$8.25;

No. 3, \$10.50; No. 4, \$13.50. 15x10%

Fulton Mach. & Vise Co.:

P. & R. Double Swivel Ma-	
ch. 40%	
Star, Solid Jaw, Machinists' 40%	
Holland's 40x40x5%	
Machinists' 65x50x70%	
Keystone 40x40x5%	
Lewis Tool Co. 30%	
Adjustable Jaw. 30%	
Monarch, 50%; Solid Jaw. 50%	
Massey Vise Co.:	
Clincher 40%	
Parallel Bar. 15%	
Perfect, 15%; Lightning Grip. 15%	
Merrill's 25%	
Millers Falls Oral Slide Pattern. 60x10%	
Parker's:	
Victor. 20x25%; Regulars. 20x25%	
Vulcan's 40x45%	
Combination Pipe. 55x60%	
Prentiss 20x25%	
Rock Island. 25%	
Snodder & X. L. 33 1/2%	
Stephens' 33 1/2%	

Saw Filers

Disston's D 3 Clean and Guide, doz.,	\$24.00, 30%; Clamps. 30%
Perfection Saw Clamps, doz. \$1.50	
Reading 60%	

Wood Workers—

Fulton Mach. & Vise Co.:	
P. & R. Double Swivel Coach-	
man's 40%	
Star Solid Jaw Woodworkers' 60%	
Massey Vise Co.:	
Lightning Grip, 15%; Perfect. 15%	
Wyman & Gordon's Quick Action, 6	
in., \$6.00; 9 in., \$7.00; 14 in., \$8.00.	

Miscellaneous—

Fulton Machine & Vise Co., Com-	
bination Pipe. 70%	
Holland's Combination Pipe. 60x60x5%	
Massey's Quick Action Pipe. 40%	
Parker's Combination Pipe:	
87 Series, 60%; 187 Series, 60x5%; No.	
870, 40%.	
Rock Island Pipe. 25%	

Wads—Price per M.

B. E., 11 up. 60¢	
B. E., 9 and 10. 70¢	
B. E., 8. 80¢	
B. E., 7. 80¢	
P. E., 11 up. 1.00	
P. E., 9 and 10. 1.25	
P. E., 8. 1.50	
P. E., 7. 1.50	
Ely's B. E., 11 and larger. \$1.70@1.75	
Ely's P. E., 12 to 20. \$3.00@3.25	

Ware, Hollow—**Cast Iron, Hollow—****Store Hollow Ware:**

Enameled 45x10%

Ground 50x5%

Plain or Unground. 60%

Country Hollow Ware, per 100

lbs. \$2.75@3.00

White Enameled Ware:

Mastin Kettles. 65x10%

Covered Wares:

Tinned and Turned. 35x10%

